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International Congresses

Two international congresses of considerable importance are soon to be held in the United States. The International Association for Testing Materials will meet in New York, Sept. 3 to 7. This body includes national associations in this and the principal European countries, and its object is to establish standard tests and rules for the materials of construction. In this work a good measure of success has already been attained, and the coöperation of government bureaus has been secured. Its membership includes representatives of engineering societies, construction and manufacturing companies in many different companies. The committee in charge of the New York meeting includes such well known men as Henry M. Howe, Robert W. Hunt, Rudolf Hering and J. A. Holmes.

The second meeting is that of the International Congress of Applied Chemistry, which will open in Washington, Sept. 4 and then hold its business meetings in New York, Sept. 6 to 13. This is an important organization including many large and active national and local societies. Both congresses will be followed by excursions which will give foreign visitors opportunities of seeing and studying the industrial development of this country.

The International Geological Congress will hold its twelfth triennial session in Canada next summer. As the leading topic of the last meeting, held in Sweden, was the "Iron Reserves of the World," the central discussion next year will be on the "Coal Resources."

Rio Tinto Pyrites

We hear that the Pyrites Co., which is the principal handler of Rio Tinto pyrites in America, finding its largest market among the southern manufacturers of fertilizers, is going to erect a factory in the South, probably in Virginia, where it expects to work up into lump form for iron furnaces the cinders from Spanish pyrites ores. We infer that this departure is caused by a desire to fill the want of such a plant at a suitable center where these byproducts from the large number of fertilizer works can be made into a form acceptable to the manufacturers of pig iron, and that the works will be established near a market.

The pyrites used by fertilizer manufacturers often contains a small amount of copper and we understand that when it is found that any of the cinders contains sufficient copper to warrant extraction, they will be lixiviated, thus rendering the material more desirable for the iron furnaces and at the same time saving a few hundred tons of copper per annum.

This is a decidedly new departure in the handling of Rio Tinto pyrites in this country and the development of the new plan will be of much industrial importance.

The Cuyuna Iron Range

Those men who have helped develop the Cuyuna iron range, in Minnesota, from the time when that region was an unobtrusive farming country until it is now a regular shipper of iron ore, have reason to be proud of their faith and the results of their work. In marked contrast to the physical features of the surface on the Mesabi and Vermilion ranges in Minnesota and the older Michigan ranges, there was and is nothing in the surface topography or geology of the Cuyuna range to aid the prospector in any way. It is true that the early surveyors noticed great variations of the compass there, but it remained for someone at a later time, about 10 years ago, perhaps less, to interpret the fact in a way that would give a definite meaning. From that time on, dip needles have been used to work out the lines of attraction. It should also be credited that in a U. S. Geological Survey monograph, the opinion was expressed that iron deposits might be found there, this opinion being based on

deductions from evidence offered by the other Lake Superior iron ranges.

It took faith to continue dip-needle work to a point where something was really indicated, and even then, the "something" was a questionable quantity. After this, drilling was necessary, and this was not only costly, but frequently disappointing. Many operators on the other ranges considered it all a waste of time and money. The work went on, however, railroads were built, and last summer one mine shipped. More will probably ship this summer and a number of others are in the development stage. The existence there of an iron range is an assured fact. Judged by some present standards, it may perhaps be called low grade. The ore, however, has its use and undoubtedly will have as long as iron is in use anywhere. Like the other Lake Superior ranges, there is a quantity of ore there at present unmarketable. It is only a question of time before this will be available, either due to exhaustion of better ore or improved processes of mining and treatment. The finding and successful opening of this interesting range may be credited to three things: Geological study, the use of the dip needle, and finally churn and diamond drilling.

The American Iron and Steel Institute

The plans of the American Iron and Steel Institute for broadening the scope of the association and increasing its membership are meeting with success, according to statements given out by its officers. Since the annual meeting in New York, in May, nearly 300 new members have been added, and these are largely metallurgists and engineers interested in the iron industry. As at first organized, the membership was chiefly composed of representatives of the large steel companies, and the general impression was that the institute was intended to bring those companies together and to treat economic and industrial rather than technical questions. The present plan for increasing the membership involves an extension of the technical side, without altogether neglecting economic questions.

In accordance with these plans, it has been decided to hold a second meeting each year, in addition to the annual meeting in New York. The fall meeting will be devoted largely to the reading and discussion of technical papers, and will be held at some point prominent in the steel industry. The first of these meetings is announced for October next, at Pittsburgh.

No reference is made in any of the publications of the institute to the American Institute of Mining Engineers, but it looks as if the execution of its plans might interfere to some extent with those of the recently established iron section of the older society. The popularization of the Iron and Steel Institute and the extension of its technical activities will certainly have a tendency to draw engineers to it, as is already shown by the large increase in membership recently made.

Hydro-Electric Power

That efficiency and economy are not synonymous at all times and places is borne out by the practice at certain mines where the supply of water for power purposes is so greatly in excess of the requirements as to make the question of power consumption one of little importance. At such mines, of which the Lluvia del Oro in Mexico may be cited as an example, the cost of operating the plant is constant whether the maximum output of the generators driven by water power or only a portion of the current is utilized. There are few mines so fortunately situated in regard to power. That there are others that may in the future be so situated is sufficient excuse for the following remarks.

Where an abundant supply of power is available at little cost, it is possible to utilize with economy many highly inefficient devices which, were the power conditions different, could only be regarded as luxuries and extravagances in mining and milling. But in order to have these conveniences larger power-plant equipment is necessary, attended by greater capital outlay. At no mine so fortunately situated should there be installed a power plant capable of generating at full load only enough power to meet the requirements of mine and mill. Where the consumption of power has no appreciable effect on costs no alert manager will fail in time to find many applications for that power, and because he may use machinery the power-efficiency factor of which is low, he may be able to reduce operating expenses more than the mere fact that power is not a factor in the costs would at first seem to indicate.

On the other hand, due regard must be observed of the possible extension of plant and operations. With such enlargement all the power that can be developed may be required. The situation would then indeed be unfortunate if much expensive, but inefficient machinery had to be scrapped. Economy is more to be desired than efficiency at a mine over supplied with power but the fact that should not be lost sight of, is that the machinery by which economy is secured at the expense of efficiency may, later in the life of the mine, entail extravagance in the consumption of power.

Not for many years has the labor situation in the Lake Superior copper district been as acute as it is at present. During the last few years the low price of copper led to the curtailment of many mining and exploring operations with the result that men were thrown out of employment and forced to seek other fields. They left the country and probably some of them found work on the iron ranges in Michigan and Minnesota. Now that copper has advanced in price and the companies have found it desirable to increase the scale of operations, they are confronted with the difficulty of securing the quantity and quality of labor that they wish. Iron-mining operations are demanding all the labor that can be found and copper mining elsewhere is equally in need. This situation is causing some embarrassment to several of the companies which would like to increase their production, and is comparatively new to the district, where labor has always been plentiful and fairly cheap.

Eastern furnaces are to have a large supply of iron ore from Venezuela, as well as from Cuba. An indication of this is the arrival of a second cargo of iron ore from Imataca, in Venezuela, and the prospect that it will soon be followed by others. The promised abundance of the supply and the possibilities of cheap water carriage may serve to restore to the iron makers of the East some of the advantage they lost when Lake Superior began to supply the furnaces of the Central West. So far as they have been opened the Imataca mines are in the hands of a Canadian organization, the Canadian-Venezuelan Ore Co.; but it is understood that prospectors from the United States are seeking iron deposits in the same region.

By the Way

Steam shovel No. 257, a 91-ton shovel, working in the west borrow pit of the Gatun dam, at Panama, excavated 84,519 cu.yd. of material during 26 working days of May, or an average of 3250 cu.yd. of material per day. Of the material excavated, 42,259 cu.yd. were classified as earth and 42,260 cu.yd. were classified as rock. This is the highest record for a month made by any steam shovel on the Isthmus since the beginning of operations.

We are amazed to note in a contemporary that "when selenium is heated together with acidulous selenium, the product obtained represents a mixture of acidulous selenium and acid of selenium," likewise "Selenium does not *congelate* at a fixed temperature," that certain modifications "are soluble in *bisulphate* of carbon," and that "red amorphous selenium is precipitated by the aid of an electrolysis" (not simply "by electrolysis," you see) "of a solution of an acidulous selenium at the negative pole." The negative pole seems slightly displaced.

An interesting report on a gold mine in Japan was recently examined by an engineer. It was written in Japanese English and signed by the "discoverer and miner." The conclusions were as follows: "This gold mine is believed to be the best, unequally by any in the world. The ore principally consist of clay and silex, colors being whitish, reddish and light blackish. Gold is present in the ore sometime so richly that it can be seen with naked eyes, but it is generally distributed in silex and clav together with small quantity of silver. Analysis of two specimens of the ore showed that one contained gold at the ratio of 1.5 to 10,000 and the other contained at the ratio of 4 to 100,000, while the proportion of silver to gold was 1 to 9. Explanation as to the methods of working the mine, refining process and business system are omitted."

If it is true that the decline in copper metal was brought about on the initiative of a few bear speculators, the large producers of copper ought to be grateful, says the *Evening Post*. They, the producers, had been saying all along that the rise was too fast, that they feared it would become uncontrollable, and that they knew of no way to stop it, though they sincerely wished, for the larger sake of the trade, that it could be stopped. It was once suggested, in the way of cynicism, that they might stop it by selling more copper, to which they painfully replied that there was no more copper to sell. Then suddenly, the price of metal on the world's largest open market, which is in London, broke sharply, and it was indignantly announced that some bears did it. Two weeks later, the price having never quite recovered from the first attack, it broke sharply a second time, £4 per ton, and this likewise was pronounced again as the work of a bear crowd. A bear crowd, to sell copper metal down, would be taking a great risk, if the metal did not exist. It ought to receive the thanks of the producers, who had been unwilling themselves to take that risk.

"Many evils are charged to the Standard Oil Co.," says the Wonder, Nev., *News*, "but there is one blessing for which the big monopoly must be given credit. The empty gasoline or kerosene can is a blessing to the denizens of the desert. Four of them filled with water make just the right load for a jackass One holds just a dime's worth of water. Split endwise, a bachelor's dishpan is the result. An experienced housekeeper cannot do without them. Cut the top out one and you have a vessel just the right size to boil a ham. Cut around three edges of one and you have a box with a door, which mice cannot molest. If the roof leaks cut up an oil can and patch it. If you want an ash pan, cut one in two and there you are. Partly fill half of one with ashes and you have a spittoon. In face, if you want to make anything, get an oil can and go to work. Long live the oil can!"

The unfortunate practice of men of prominence in lending their names to enterprises in which they have no training or in which they do not realize the necessity of employing competent advice, is again illustrated in the experience of Admiral Robley D. Evans. The California Consolidated Oil Co. was exploited on the strength of Admiral Evans' name and many people bought stock therein because he was president. What Attorney Wack, of the stockholders' committee, called the "obsequies" of the company were held at 42 Broadway on July 8, when 40 men and women constituting the committee heard that their property had been juggled out of their hands by certain of the directors. Admiral Evans is said to have put into the treasury of the company all the emoluments of his office and in addition, advanced the company $2300 which is now owing to his estate. Two months before his death, Admiral Evans addressed a letter to stockholders in which he stated that the Lincoln Stock & Bond Co., the fiscal agents, had sold Consolidated stock in a way in which the latter company received no benefit whatever. Last autumn, the Consolidated obtained a controlling interest in the Yellowstone Oil Co. On Dec. 29, 1911, three directors of the Yellowstone, who were also directors in the Consolidated, caused the stock of the Yellowstone company to be assessed 5c. per share. The Consolidated company could not pay its $26,000 assessment and its stock was forfeited. Then in February, the directors decided to assess all Consolidated shares 10%; a large salary bill to J. Q. A. Walker was passed by the directors, and in other devious ways Admiral Evans saw the stockholders being mulcted while he was powerless to aid those whom his name had drawn into this mirage of "investment." The Admiral tried to block the attempt of the clique of directors to wreck the company and had picked up and was reading a pettifogging letter of Director Walker's when he was seized with an attack which brought on heart failure. Friends assert that the Consolidated killed him.

It is to be spelled "Timiskiming" hereafter, instead of "Temiskaming." At least the Dominion Geographic Board has so ruled. The judicial district is to be henceforth spelled Timiskaming, as is likewise the important mining division of that name, and Chairman Englehart, of the T. & N. O. Ry. has announced that the railway commissioners intend to adopt the new spelling. Many names in various parts of Canada are spelled in different ways by the Dominion and Provincial authorities and it is the purpose of the Dominion Geographic Board to standardize the spelling of these places. While the multiplicity of "i's" in Timiskaming does not appeal at first sight, we presume the Geographic Board has sound reasons for the change, but it will probably be difficult for the people of Quebec to forsake their picturesque "Temiscamingue" for the new spelling. The ruling of the board, according to the Cobalt *Nugget*, has also been extended to Temagami, which will in the future appear on the government maps as Timagami.

Some time ago the JOURNAL reported adversely about a certain metallurgical process. In spite of our unfavorable remarks, one of our subscribers in Idaho, evidently disposed to take a sporting chance, communicated with the exploiting company, sent it for test a sample of his ore at more or less expense, incidentally mentioning what the JOURNAL had said. An officer of the company in reply mentioned that the JOURNAL's description of its process was "about as accurate as would be a technical description of a faro game, written by an Eastern Sunday-school superintendent who had never been west of the Hudson River." Our subscriber's experience was unsatisfactory to him and after correspondence extending over a year he finally declined the invitation of the promoting company to go further with the process, remarking in a letter to it: "No, we know out here when we are stung. We regret very much that we did not take the gentle hint from the ENGINEERING AND MINING JOURNAL in the first place. It seems to know more about the difference between a straight faro game and a brace game than you're willing to give it credit for. In the future we shall try to profit by its advice."

Venezuelan Iron Mines

Advices from Venezuela note a large degree of activity at the Imataca iron mines, which are on the Orinoco River near the point where it passes through a pass or cañon in the Imataca Mountains. The work there is being done by the Imataca Ore Co., which is controlled by a Canadian organization, the Canadian-Venezuelan Ore Co., having its headquarters at Montreal. This company has secured possession of a large area, on which tests have been carried on for two years past, disclosing the existence of large bodies of ore of good grade. Another area has been denounced by agents who are said to represent Pennsylvania iron makers. The ore is chiefly hematite, with some limonite. The operations of the Canadian company are described in a report from United States Consul W. D. Henderson at Ciudad Bolivar. The only difficulty in transportation is found in the fact that not more than 14 ft. draft is possible up the Orinoco to the mines, which would prevent the use of large steamers in carrying the ore.

The Imataca Ore Co. commenced prospecting some 18 months ago, and actual operations, with a view to exploitation, began last November. Since then the "Alabama," of 1100 tons, has made three trips from Philadelphia with machinery and supplies, returning once in ballast and twice with a full cargo of ore. The equipment brought down for handling and loading the ore is of modern design, being operated by electricity generated in a 1000-hp. station equipped with Babcock & Wilcox boilers. Two endless-rope haulage tramways, one from the east and one from the west, will transport the ore from the different tunnels and open cuts to a central hill, where the cars will run out to a tipple trestle and be dumped into large pockets excavated in the hill on either side of the trestle, each capable of holding 10,000 tons of ore. Beneath each of these pockets are tunnels of reinforced concrete with chute openings, whereby the ore may be run out to an endless belt conveyor. This belt conveyor will carry the ore to a pier and elevate it to a trestle whence a chute will pour a steady stream of ore into the waiting steamer. The rope tramways and conveyors are operated by 100-hp. electric motors.

For construction and repairing purposes the company has a machine shop, with modern machine tools, a woodworking shop, and a sawmill. A large warehouse and store and a refrigerating plant are also a part of the equipment. All dwellings and buildings are constructed of expanded metal and concrete, and are both sanitary and cool.

At the present time the east tramway, power house and pockets are well under way, and a few months more will see them in full operation. The company is giving employment to some 400 laborers, machinists and miners, recruiting from all parts of Venezuela, British Guiana, and the West Indies. This labor has proved satisfactory, and the supply seems ample, for as the mines are better known the daily ingress of men is increasing. So far the only actual mining has been temporary opencut work, sufficient to load the supply steamer with a return cargo.

An analysis of a cargo of Imataca iron ore, shipped by the Canadian Venezuelan Ore Co., of Montreal, is given by *Iron Age*, May 2, 1912, as follows: Fe, 68.2%; P, 0.016; S, 0.042; SiO_2, 1.4; TiO_2, 0.231 per cent.

Arizona Commercial

GLOBE CORRESPONDENCE

The property of the Arizona Commercial Copper Co. was sold by the receiver, Charles L. Rawlins, at a public sale on the courthouse steps, in Globe, on June 11, to Charles S. Smith, president of the new Arizona Commercial Mining Co., who bid $1,000,000 for the property, his bid being the only one offered. The sum represents the par of the bonds of the old company, to be exchanged for stock in the new company. This is virtually the final step in the reorganization. The new company is incorporated under Maine laws with 300,000 shares, par $5, of which 140,000 shares will be given to the holders of the $1,000,000 bonds of the old company, 120,000 shares will be exchanged for the 120,000 shares of the old company upon the payment of $3 per share, which money is now in the hands of a trust company, and 40,000 shares will remain in the treasury. The treasury stock is under option at $5 per share to the men that financed the reorganization. After the money expended by the receiver for the development of the property during his receivership, and other expenses have been deducted, there will be nearly $300,000 left in the treasury. Regarding future development, President Smith stated:

> Equipment for hoisting from a depth of 1000 ft. has been ordered for the Copper Hill shaft and I hope to see it erected and in operation within 90 days. The double-drum steam hoist at the Eureka shaft will be moved to the Copper Hill shaft and will be electrically equipped and the air compressor at the former shaft will be moved to the Old Dominion power house. An air line and electric power line will be built to the shaft from the Old Dominion power house, giving us cheaper power and air than we could obtain by having our own steam plant. In the meantime we will continue retimbering and enlarging the shaft with our present equipment and will be building the new headframe. The railroad will be leased to the Old Dominion Co., under some equitable arrangement whereby they will haul our ore and freight as, with their railroad equipment and repair shops, they can operate it much more cheaply than we could. After the shaft has been equipped, we will begin aggressive mining and development work on the several veins. We believe that the vein which has thus far been worked is a continuation of the Old Dominion vein and experience in the Old Dominion and Gray mines leads us to believe that good bodies of ore will be found. The ground has been pretty well stoped out above the fourth level, but I think considerable ore will be found between the fourth and eighth levels, the latter being the lowest level to which the workings extended. . . . The other veins will be explored at various levels. Profitable ore has been taken from the adjoining United Globe mine within a few hundred feet of our end line, and I believe that similar ore will be found within our lines. The fourth level is now connected with the third level of the Gray shaft of the United Globe mine and arrangements will be made with the United Globe company to make further connections at greater depth to comply with the new mine-inspection law which states that more than one means of egress shall be provided for men engaged in stoping operations. The arrangement will also give ventilation to both mines and should prove economical to both companies.

Mining Appropriations

WASHINGTON CORRESPONDENCE

The Senate committee on appropriations has reported to the upper chamber a revised draft of the sundry civil appropriation bill. The bill includes an important provision with reference to the Bureau of Mines, it being intended to enlarge the allowance for that Bureau so as to extend its work to metal mining. The latest draft of the bill made public on July 16 contains the following new provision regarding the metal-mining activities desired for the Bureau and the pecuniary provision which it is proposed to make for them:

> For inquiries and investigations into the mining and treatment of ores and other mineral substances, with special reference to safety and waste, including personal services in the District of Columbia, and expenses of attendance at meetings in behalf of the purposes of this appropriation, $100,000: Provided, That no part thereof may be used for investigations in behalf of any private party.

The bill also provides additional allowances as follows: "Investigation as to causes of mine explosions, $27,900; for mine inspector for Alaska and per diem $7500; total, $35,400."

The Senate draft of the bill also contains some important items of increase for the Geological Survey, providing additional sums, as follows: "Topographic surveys, $25,000; geologic surveys, $25,000; gaging streams and determining water supply, $25,000."

The Senate has passed a measure providing for the use by the Mint of the unexpended balance for refining bullion, until regular appropriations are available.

Correspondence and Discussion

Views, Suggestions and Experiences of Readers

The Kinsavvy Mine

In the Feb. 17, 1912, issue of your popular publication, there appeared as special correspondence, under the caption, "History of a Once Famous Arizona Gold Mine," a statement, that in 1892, the Fortuna mine, near Gila, Ariz., was discovered in consequence of a prospector picking up a piece of rock to throw at his burro, which he found to be full of gold—that is, the rock, not the jackass.

This alleged discovery is a "pale, pink-tea" plagiarism on the original discovery of the Kinsavvy mine, at Whiskey Flat, against which all the inhabitants of that formerly famous camp now designated under the more modern and perhaps more respectable name of Kernville, most earnestly desire to protest.

Which the same I would rise to explain.

The discovery of what was subsequently known as the Kinsavvy mine, was the first, and, as Whiskey Flat firmly believes it to be, the only discovery of a mine by the interposition of a jackass—all the glory whereof is due to a man locally known as "Lovely Rogers":

And I will not deny,
In regard to the same,
What that name might imply.

When it is remembered that in early days a man acquired his sobriquet from the opposite of qualities possessed by him, such as "Truthful" for the biggest liar in camp, "Parson" for the wickedest, "Skinny" for the fattest, and "Whispering" for the man with the loudest voice, the imagination may be left to supply an inventory of the attributes which gave to Rogers the handle of "Lovely"; but, nevertheless, in combination with his jackass and a piece of quartz, Lovely Rogers discovered the Kinsavvy mine.

In its own humble way, Lovely's jackass was also a distinguished local character. It is known that it would pass by a bale of hay with an expression of supreme contempt, to seek its favorite diet of cactus, with a dessert of granite, on which it sharpened its teeth and its evil temper at the same time. This is important, because it was due to these traits that the discovery of the Kinsavvy mine was made by Lovely Rogers.

When what is known as the first gold rush up Kern River occurred, Lovely Rogers, accompanied by his burro and outfit, followed and finally camped at what became known as "Whiskey Flat." As was usual in those days, when camp was made the burro was turned out to subsist on the country, but, owing to his perverse appetite, instead of remaining to feed upon the soft, sweet grasses along the banks of the beautiful Kern River, he pointed his obstinate head toward Split Mountain and mounted to the foothills, where cactus and granite were plentiful.

In the morning, when Lovely was ready to continue his journey, the jackass had failed to return, and, after the usual time spent in denunciatory remarks of an unprintable character, Lovely Rogers sought him out and found him at what has since become known to fame as the Kinsavvy mine.

With considerable heat, Lovely picked up a good-sized chunk of rock to throw at his "Burroship," but, good prospector as he was, Lovely, not the jackass, discovered by its weight that he held a prize in his hands.

Back to camp he ran, when crushing and horning disclosed that the rock was full of free gold; whereupon he made his location, and others following, making further discoveries, Whiskey Flat soon had a large population, with abundance of gold and all the picturesque attractions of an early, flourishing camp, with its wide-open gambling halls, fandangos, rapidly filling graveyard, and Wild Bill roadagents, keeping watch on each departing bullion train.

In course of time Whiskey Flat changed its name to Kernville, and became the county seat of Kern County; the court supplanted the miners' meeting; the gamblers and fandango stars each became *persona non grata;* and the signal, three pistol shots, ceased to call a community convention. Instead, the sweet sound of the Sabbath bell summoned the worshipper to his devotions, and the school bell called the young to their daily tasks—for long ago both church and schools came to stay.

PANORAMA SHOWING SPLIT MOUNTAIN

The later generations are proud of these monuments of a milder civilization, and proud of the distinguished and successful commercial and professional men whom they have produced and sent forth into the great outer world; but the old timers seem to feel that these softening influences mark the passing of the sterner qualities of the pioneer, and often sadly sigh:

For the days of old,
For the days of gold,
For the days when men were bold.

But, as to the discovery of the Kinsavvy mine by Lovely Rogers and his jackass, there is no such division of sentiment. The old men of Whiskey Flat, and the young men of Kernville, all unite in loyalty to this tradition.

This will be readily understood when it is stated that it is proposed to erect in the public square, at the foot of Split Mountain, a statuary group composed of

Kinsavvy quartz and portland cement, to commemorate the discovery, as soon as the cost of concrete shall have become cheaper. In fact, local sculptors are busily engaged at present in considering an appropriate design. The most talented of these artists proposed to place a life-sized figure of the burro upon a proper pedestal with the usual prospector's pack, roped on its back with a squaw-hitch, prospecting pan at the apex, and the figure of Lovely Rogers squatted thereon, Turk fashion, holding a piece of quartz in the right hand, and pointing with the left to Split Mountain.

It was suggested, however, that Lovely Rogers was a Missourian, not a Turk, and that this design might be construed to be a reflection on Missouri. As the type of Missourian, "keerless with a gun when riled," still abides with us, for obvious reasons this design had to be wholly abandoned.

One old-timer said the design should show the jackass similarly packed, with Lovely yanking on the halter and planting his heavy boot in the burro's ribs.

It has the advantage of being true to nature, as this life-like pose was often observed, whenever Lovely had planned a prospecting tour to the south, and the jackass had scheduled the trip to the north; but right here, another controversy arose. Fidelity to nature demands that the true size of the foot should be depicted. The Missouri foot is not of lady-like proportions, which, however, does not prevent a Missourian from being sensitive on this subject; wherefore, it is to be feared that this admirable design will likewise have to be forgotten in the interest of peace and to avoid possible bloodshed.

This digression from history to art may happen to be wholly irrelevant, but it will serve to show the fixed and unalterable determination of this community to preserve in imperishable form, the fact of the first and only genuine discovery of a mine by the jackass method.

Unfortunately, Lovely Rogers is dead, and the jackass also is dead, otherwise the town would be able to afford irreproachable evidence of the fact of this important discovery; but, where historical facts are concerned, what does death signify? Julius Cæsar is dead, but the war horse on which he crossed the Rubicon still exists as a means to a liberal education.

Napoleon Bonaparte is dead, but the mule on which he crossed the Alps still lives in story.

George Washington is dead, but the cherry tree still figures among our arboreal statistics. Santa Claus is dead—but it is unnecessary to multiply illustrations. Suffice it to say that, although Lovely Rogers has yielded up the ghost, and like the grave of Moses, the last resting place of the jackass is unknown, the memory of a discovery vital to the fame of Whiskey Flat must, and shall be, preserved.

No upstart camp by the Gila shall be allowed to dim the glory of its fame. The idea, too, of Arizona trying to lay claim to importance!

Why, Mr. Editor, when Lovely Rogers and his jackass discovered the Kinsavvy mine, Arizona was a wilderness of sand, cactus and sage brush, fit abode of such denizens as the horned toad, side-winder, the coyote, and the scarcely superior Yumas, Mohaves, Apaches and Maricopas, whose highest conception of a *costume dé rigeur* was a gee-string cinched around the belly, with a sort of diaper tied thereto, fore and aft.

Positively insufferable is this felonious attempt of Arizona, thus to appropriate to its own renown, the laurels of a California jackass.

It may be asked why such seriousness and strong desire to secure justice is shown in support of the claims of an humble and despised quadruped like Lovely's jackass? The answer is that honor should always be vigorously maintained.

Every locality has a just right to feel proud of its distinguished but departed heroes, and Whiskey Flat may easily find justification in the fact that every hamlet in Greece contends for the honor of being the birthplace of Homer.

Why, therefore, should the melodious memory of the distinguished jackass be less sacred to Whiskey Flat than the songs of Homer to Greece?

The right of Lovely's jackass to equal distinction is indisputable, because it is founded on equally authentic history—

Which the same I am free to maintain.

Now, Mr. Editor, if you will kindly publish these few lines in your most excellent journal, the truth of history will be vindicated, and you will greatly oblige,

GAMBUSINO JAMES,
Alias GARRULOUS JAMES.

Whiskey Flat, *alias* Kernville, Kern County, Calif., June 29, 1912.

P. S.—No relation to Taciturn James, Prayerful James, Philospher James, or Truthful James. G. J.

Quantity of Reagents Used in Analyses

In commenting on the iodide method of determining copper, R. L. Hallett, in the JOURNAL of July 13, 1912, makes the statement: "If care is taken to use only a slight excess of the different reagents the method will be found quick and accurate . . . ." That is a statement that many engineers who are now and then obliged to do some analytical work would do well to paste in their hats. I have observed that inexperienced graduates and engineers unaccustomed to such work are prone to use quantities of reagents many times in excess of those actually required. Trained chemists, of course, know their business, but to the man who only infrequently makes copper analyses, I would suggest, if the work seems messy to him, to try using a smaller quantity of acids and keeping down the volume of the filtrates.

C. S. CASE.

New York, July 8, 1912.

A Long Raise

In regard to your editorial in the JOURNAL of June 22, describing a long raise in the Rolling Mill No. 2 Iron Mine, in Michigan, I venture to present a few facts in regard to a longer raise which came under my notice, in the hope that they may be of interest. I regret that at the moment I have not the figures by me so as to be able to give you perfectly accurate data.

The example I mention is the raise at the Monarch mine of the Coeur d'Alene North York Mining & Milling Co., Murray, Idaho, where I was employed in 1909. The total height of the raise was 950 ft. The rock dimensions were about 9x13 ft.

The rocks cut by the raise were a tough blue slate and a hard quartzite belonging, respectively, to the Prichard and the Burke formations. The rock was cut with hammer drills of the telescope type, the Waugh drill being settled upon after a number of makes had been tested. The timber was framed by hand, after being squared with a broadax. The material was mostly dead-pine standing timber resulting from a forest fire a number of years before. Ventilation was provided by means of an 8-in. exhaust flue which communicated through about 3500 ft. of tunnel, with a rotary water-driven blower. Air was furnished by a compressor driven by a Pelton wheel under about 90-ft. head.

The work was done by contract, by four Swedish miners, who worked two shifts a day in pairs. Each shift had an engineer, paid by the contractors, who handled the men and supplies by means of a compressed-air hoist working over a sheave in the top of the raise, which was moved up with every 15 ft. of advance. A mucker with a horse was employed on the day shift to take out the muck and handle supplies through the adit, which, as mentioned above was 3500 ft. long. The timber was framed by company men, two in number. One blacksmith was employed on the job.

The raise was timbered in two compartments, one for the cage and manway, the other one was boarded off to serve as a chute for the muck. At the time I was there the rate of advance was about 190 ft. per month. The raise was successfully holed through into the upper-shaft workings about the beginning of 1910.

STEPHEN ROYCE.

Cambridge, Mass., June 24, 1912.

Falls of Ground in Mines

It is well known that the majority of serious mining accidents are due to falls of ground. With frequent vibrations set up by explosions, and the constant percolation of water, combined with roof tension and distortion of strata, ground which appears sound and rings clearly, may in a few days collapse without warning. As accidents from this cause usually occur singly, they do not excite anything like the sensation produced by a large spectacular disaster and most of them pass unnoticed or only arouse a languid interest.

Because more care is exercised in inspecting treacherous ground, accidents from falls of roof are less frequent than in mines where the roof is strong. In the Transvaal the law forbids natives to enter a stope until a white "ganger" has inspected the roof. There, it is advocated that inspectors be appointed whose only duty shall be to examine the condition of the roofs, as in that way it is believed the number of accidents can be reduced.

Note—Excerpts from a paper by James Chilton on "Accidents in Transvaal Mines," read at the November meeting of the Chemical, Metallurgical and Mining Society of South Africa, and printed in the Journal of the Society.

Accidents Most Common in Good Ground

Mining men all the world over have observed that most accidents from falls of ground occur in districts or mines having good roofs. When the hanging wall is known to be insecure, special precautions are taken and various systems of timbering are tried until one is evolved suitable to local conditions; on the other hand, with a good roof the most elementary preventive measures are neglected, pillars are left too far apart, or not left at all, until the overhanging weight overcomes the resistance of the roof beds and a fall occurs.

Article 97 of the Transvaal Mines Regulations requires:

"Before commencing work either at the beginning of the shift or after blasting, the ganger of the shift shall be the first to enter the working place and until he considers it safe he shall not allow any workman to proceed there except those required to make the place safe."

This regulation, if carried out, would prevent a large number of accidents, but in most mines it is disregarded and many natives enter the working place before the ganger arrives, with the too frequent result that a slab of hanging kills or injures some of them. Miners on contract allow this practice because they profit by the extra work done, and many mining officials wink at the contravention, having the short-sighted idea that it is good mining practice. In some mines an underground official makes surprise visits to the stopes in the early morning and promptly prosecutes any native found there before his white ganger has arrived.

Back stoping and resuing are probably the best methods of preventing disastrous falls of ground, but these methods are only suitable with ideal conditions. The former method is advantageous with highly inclined stopes, but has few merits in flatter workings, while the latter is only suitable for hand-labor conditions, and since hand-stoping, owing to scarcity of native labor, is likely to become a "lost art," the practice of resuing will probably accompany it to the limbo of forgotten things.

With increasing depth it follows naturally that roof pressure will increase even though the angle of dip remains unchanged. Most Transvaal deep mines, however, show a serious flattening of the orebody, and as this becomes more horizontal with increased depth greater pressure will be thrown upon the hanging walls and pillars, causing falls of ground to become more numerous.

The detonation of heavy charges of explosives, due to the increased use of rock drills, subjects the roofs to great shock and vibration and greatly increases the number of subsidences and falls underground. Accidents due to tension blasts or "air blasts" are also becoming more numerous with depth. This latter class is difficult to account for and more difficult to prevent, but is probably due to some distortion of strata that is taking place in the Witwatersrand beds.

Roof Inspectors Suggested

For the prevention of accidents from falls of ground, the author advises the appointment of roof inspectors and the systematic timbering of stopes. In some of the Transvaal gold mines an official has been appointed whose sole duty is to prevent accidents from falls of roof and sides. This person visits the working places as often as possible and submits a daily report to the underground manager, giving a detailed account of the condition of the roof and sides in the places visited. This report, coupled with the reports from the shift bosses, enables the underground manager to keep in touch with the varying roof conditions all over the mine, and measures of precaution can be taken before the roof pressures get beyond control.

At present there are two methods of stope timbering in the Transvaal mines. In one no timber is used except under isolated slabs or areas that are obviously dangerous. In the other, while dangerous ground is closely timbered additional supports are inserted at fairly regular intervals under hanging that apparently needs no support.

This latter is a near approach to what is known as systematic timbering. This method was first employed at the Courrières collieries, in France, where, owing to the peculiar formation of the coal seams, ordinary methods of timbering were found to be insufficient to prevent accidents from falls of roof and sides. Experience there showed that a large proportion of accidents occurred from falls of roof in which no slip or fault could previously be detected and this danger could only be met by timbering being done at regular intervals regardless of varying roof conditions. After a year's trial of the new method it was found that the accident rate from falls had decreased 87.5 per cent.

Features of the English Law

In 1901 a commission of mining inspectors was appointed by the English Home Office to visit these collieries and report on the system with a view to its adoption in the English coal mines. As this report was favorable, systematic timbering was embodied in the Coal Mines Regulation act and became law in the United Kingdom. This law, though severely criticised when promulgated, is universally recognized as a step in the right direction, and the new regulations which will come into force in July, 1912, are as follows:

The manager shall by notice specify the manner in which the supports are to be set and advanced and the intervals to be observed on roadways and at the face:

(a) Between each row of props.

(b) Between adjacent props of the same row.

(c) Between the front row of props and the face.

If the inspector of the division considers that the system of supporting the roof is unsatisfactory by reason of the distances fixed or any of them being excessive or otherwise he may require the manager to fix some lesser distance or othrwise modify the system.

All methods of timbering must be based on the methods of working, the nature of roof, slips, faults and foot wall; these differ considerably even in the same mine and at times in the same stope. The maximum distances between supports can only be presented in these rules, and it will frequently be neces-

sary to set timber above the requirements of the rules. The erection of these additional supports must be left to those working in the stope who alone are aware of the momentary changes in the roof conditions.

In 1910, the Transvaal bill for round mining poles and lagging amounted to £162,895 or less than 1½d. per ton over the mineral output; this coupled with the expense of setting would probably amount to 4d. per ton. If systematic timbering was produced, probably timbering costs would rise to 6d. per ton. Against this rise of 2d. per ton there would be a larger labor force, a greater freedom from accidents, less compensation costs, the recovery of large quantities of broken ore that is now buried under collapsed stopes, less cost in the rewinning of stope faces and less waste rock sent to the surface. The amount saved on these items would leave a handsome profit over the cost of systematic timbering. Even if systematic timbering raised mining costs considerably, humanity demands that this or some other method must be tried, and that this waste of human life must not continue.

In succeeding discussion Tom Johnson expressed the view that in the Transvaal there are not enough inspectors of mines, adding: "The inspectors at present have no time to visit a mine except when they go to see about an accident, and then they have no time to inspect anything except the site of the accident. Inspectors should be appointed to do nothing else but inspect the mines in rotation, and they should have nothing to do with accidents. Then they should make more examples when they find things wrong. There is plenty of room for it. Punishment is about as good as anything for stopping accidents."

Capt. William A. Dunn

Capt. William A. Dunn died at Houghton, Mich., July 6, aged 71 years. Born at Glengary, Ont., he was obliged to earn his living at an early age and was for a number of years employed in lumbering and contracting work. In 1867 he went to the copper country and for two years worked for the Calumet & Hecla. In 1869 he sunk the shaft of the New York mine, where the city of Ishpeming now stands. He opened the Kloman mine at Republic in 1872. He operated this mine for nearly three years and then he turned his attention to the manufacture of high explosives. In 1872 he assisted Jacob Houghton in introducing high explosives at the New York mine. He had faith in the practical value of nitroglycerin as a mining explosive, if it could be used with an absorbent material to lessen its danger. He experimented with sugar, powdered slate, charcoal dust. The slate proved best for the purpose and this crude dynamite was used successfully by its originator. He it was who introduced nitroglycerin into the Calumet & Hecla. In the years following Capt. Dunn opened several mines on his own account or for Moore, Benjamin & Co., of New York. He became one of the leaders of business and political affairs in Houghton County and in 1892 was elected sheriff, serving two terms, ending in 1896. When Capt. Dunn had completed his terms as sheriff he turned his attention again to mining. The Baltic lode had been located and a test pit had been located on Six-Mile Hill, now the site of the Baltic mine. Unaided, Capt. Dunn set about the development of this pit and in a short time, comparatively, he demonstrated that a mine was there. Then the Stantons became interested with him and the present South Range mines are the results of Capt. Dunn's faith in his own judgment of copper-bearing ground. For some years following his development of the Baltic Capt. Dunn lived in virtual retirement. Then in 1902 an attempt was made to revive the old Phœnix in Keweenaw County. Here Capt. Dunn worked for nearly three years, till the project was abandoned. Since then he had lived quietly at his home in Houghton.

Graham Pope

Graham Pope, one of the best known of the pioneers of the Lake Superior copper country, died at his home in Houghton, Mich., July 7, aged 71 years. He was born in Boston, educated in the public schools of that city and for a year following his graduation worked at the bench in a nautical and scientific instrument shop. He then took a position in a large Boston mercantile house that controlled a number of woolen and cotton mills. Here he acquired his business education. The last year of this service he spent in reporting on conditions in the machinery and economy of the mills. In 1861 he went to the copper country to enter the employ of the Isle Royale Mining Co., but soon after enlisted in the 23d Michigan Infantry, in which he served through the Civil War. On his return he went back to the Isle Royale, with which he remained until 1871, when he was made treasurer and manager of the Houghton Copper Works, which institution was obliged to close in 1873 on account of lack of capital. For a few years Mr. Pope was engaged in tribute mining and in 1878 became a member of the mercantile firm of Pope, Shepherd & Co., later becoming sole owner. In 1892 he re-entered the mining field as manager of the Franklin mine and in 1899 he again gave up mining owing to pressure of private affairs. He closed up his mercantile business about this time and retired to private life. For several years past his health had not been good and he spent his winters in the South.

This brief summary scantily expresses the fullness and activity of his work. He bore his full share of the labors and hardships of the early days in the copper country. He was connected at one time or another with nearly all of the older companies, and was intimately acquainted with their history. At more than one meeting of the Lake Superior Mining Institute his reminiscences of the early days were an enjoyable feature. He was a member of Stiles Post, Grand Army of the Republic, Hancock, and is the donor of the handsome soldiers' monument, dedicated to the memory of the Houghton County soldiers in the Civil War. This monument was dedicated last Memorial day, and it was unfortunate that Mr. Pope's ill health prevented his presence at the ceremonies. He always had been prominent in municipal affairs in Houghton, a leader in every movement for the civic good. He was one of the first citizens of the village of his adoption and his death will be mourned sincerely throughout the district.

Mr. Pope was married in 1864 to Miss Alice H. Fuller, of Houghton. Mrs. Pope died in 1876. She and her husband are survived by three children, George E. Pope, of Nevada, Miss Helen G. Pope, of Houghton, and Mrs. May T. Cranston, of California.

British Columbia 1911 Mineral Production

The annual report of the minister of mines for British Columbia for 1911 shows that the total value of the mineral production was $23,499,072, a net decrease of $2,877,994 from 1910. The details of the 1911 production are as follows: Placer gold, $426,000; lode gold, $4,725,513; silver, 1,892,364 oz.; lead, 26,872,397 lb.; copper, 36,927,656 lb.; zinc, 2,634,544 lb.; coal, 2,193,062 long tons; coke 66,005 long tons; miscellaneous products, $3,547,262, this being the only item showing an increase.

The decrease in production is largely due to the shutdown of the coal mines of East Kootenay district for eight months owing to labor difficulties. There was also a strike of the Crow's Nest miners which cut off the supply of coke for copper-smelting purposes for about five months at the Granby smeltery, resulting in a reduction of the quantity of metals produced.

The tonnage of ore mined in the lode mines of the province during 1911 was 1,770,755 tons, a decrease from the preceding year of 445,673 tons or 20%. This total tonnage was produced by the various districts in the following proportions: Boundary, 70.25%; Trail Creek, (Rossland), 14.36%; Fort Steele (East

Kootenay), 1.74%; Coast, 8.09%; all other districts, 5.56%. The number of mines from which shipments were made was 80, and of these only 45 shipped more than 100 tons each during the year, while but 30 shipped in excess of 1000 tons each.

Of the total production of placer gold, $225,000 was from Atlin division of Cassiar and $170,000 from Cariboo and Quesnel divisions of Cariboo district. Rossland mines contributed nearly $2,412,000 of the lode gold; Boundary mines, $1,814,000; those of the Nelson division $365,000 and of the Coast district $120,000.

Slocan district mines, including Ainsworth, produced silver to the value of $441,000; East Kootenay, $167,000; Boundary, $166,000; Coast, $51,000; Rossland, $45,000; Nelson, $39,000; Lardeau, $34,000. Of the lead production East Kootenay produced $683,000; Slocan and Ainsworth, $278,000; Nelson $77,000; Lardeau, $20,000, and nearly $10,000 from Portland Canal district.

The chief output of copper was from the Boundary district with a production of $2,764,000, the Coast mines coming next with $1,362,000, followed by Rossland with $425,000. The production of zinc, valued at $129,000, was chiefly from the Van Roi mine, near Silverton, Slocan Lake. The total number of men employed at the mines of the province in 1911, was 10,467, distributed as follows: 3594 at metal mines and 6873 at coal mines.

Indian Refining Co.'s Martinez Plant

The Indian Refining Co. is proceeding rapidly with the construction of its new receiving plant at Martinez, Calif., says the San Francisco *Chronicle*. The grading for the refinery building and oil-storage tanks is progressing fast. This is the second large station being built on the coast by the company. The first is being completed in Seattle. A third station is being planned for San Pedro harbor. It is proposed to purchase most of the refining oil in Borneo and Sumatra from the Shell-Royal Dutch Co. It will be conveyed to California in ocean tankers. Much of the trade will be with the Orient in competition with the Standard, and the remainder of refined products will be sold on the Pacific Coast.

Electrostatic Zinc Plant Sunnyside Mill

By Warren C. Prosser*

At the new zinc plant of the Sunnyside mill, Eureka, Colo., the American Zinc Ore Separating Co. installed Huff electrostatic machines to treat the zinc middling produced in the wet-concentrating plant.

The fact that this product, nearly 90% of which will pass a 150-mesh screen, is being successfully treated speaks well for the usefulness of the process for the treatment of the lead-zinc-iron ores of the district. This type of ore is especially abundant in that part of the district tributary to Eureka, Gladstone, Animas Forks and Mineral Point.

Electrostatic Zinc Plant, Sunnyside Mill, Eureka, Colo.; Wet Concentrator in Background

The equipment of the new plant includes a car elevator, original middling bin, Ruggles-Coles dryer, trommels and Huff electrostatic machines. The zinc product is shipped to zinc smelters at Caney, Kan. and the highly desirable lead-iron-copper product is handled at the Durango plant of the American Smelting & Refining Co. These two constitute the separated products of the machine. In the accompanying halftone the wet-concentrating plant is shown in the background and the new zinc plant in the foreground.

South Australia Mineral Production

The official report shows the following mineral production in South Australia in 1911: Copper, 5922 long tons; crude salt, 65,000 tons; iron flux, 42,300 tons; gold, 3537 oz.; limestone flux, 28,700 tons; phosphate rock. 5800 tons; silver, 1400 oz. There were also productions not enumerated by weight, but given by value, as follows: Gypsum, £7275; bluestone, £4163; sulphuric acid, £6940; pyrites, £2580; all else, £1464; a total value of £450,054 is given to the mineral output. The greatest changes are the decreases in gold and silver production, from 6603 to 3537 oz., and from 6250 to 1400 ounces.

*Mining engineer, Silverton, Colo.

Operations at Goldfield Consolidated for May, 1912

During May, 1912, the total production of the Goldfield Consolidated Mines Co. was 30,215 tons, containing $550,656, an average of $18.22 per ton; of this 29,029 tons were milled with an average extraction of 91.44%, and 1186 tons were shipped of an average grade of $28.25 per ton. The net recovery from all ore was $16.69 per ton and the total net realization was $309,622 or $10.17 per ton.

Development work amounted to 2911 feet.

The total cost of mining, development, transportation, milling, office and general expense was $6.72 per ton.

MAY OPERATING COSTS AT GOLDFIELD CONSOLIDATED

Mining		
Development	$0.82	
Stoping	2.45	$3.27
Transportation		0.08
Milling		2.20
Marketing		0.07
General expenses		0.67
Bullion tax		0.11
Marketing ore shipped		0.25
Construction		0.07
Total cost of operation		$6.72
Miscellaneous earnings		0.12
Net cost per ton		$6.60

At the Combination, the new stope in the Reilly vein southeast of the shaft produced 1100 tons of $56 ore. The 328 sill produced 50 tons of $30 ore. The downward extension of the 402-C stope produced 260 tons of $28 ore. This is the greatest depth at which ore has been found in this mine. At the Mohawk, the sill floor of the 3-D stope in the Sheets-Ish workings on the 150-ft. level produced 200 tons of $39 ore. The 215-X intermediate drift under the 111 stope has been extended about 80 ft. through $12 ore. This orebody is the downward extension of the big 111 stope and will produce a large tonnage of good ore. The 307-V raise on the third level passed through 10 ft. of $80 ore. This ore is the upward extension of the 307 stope that was cut off by the Mohawk fault. The 354-Q stope on the 450-ft. level produced 260 tons of $45 ore. A new section of the 407 stope on the 600-ft. level produced 648 tons of $52 ore.

Superintendent Thorn states that at the Clermont, the greater part of the development work is being done on the lower levels, where good results are being obtained, especially on the 1300-ft.

level of the Grizzly Bear shaft. From this level the third compartment of the shaft is being raised to the 1000-ft. level, and is progressing 20 ft. per day. A drift is also being driven on the new orebody, which has been advanced about 80 ft. through $20 ore. The crosscut has been stopped until the shaft has been enlarged and a double-drum hoist installed. After this work is completed, development on this level, as well as sinking the shaft to the 1450-ft. level, will be carried on more rapidly. In the Laguna the sump below the 720-ft. pump station and the main station have been completed, and a pump installed to take all the water to the surface in one lift. The work of prospecting the large quartz mass on this level is now in progress. The Jumbo has been connected on the 250-ft. level with the workings on the south end of the property under the old Zinn lease, and the work of stripping and extracting pillars resulted in a production of 537 tons of $46 ore.

The University of Illinois Mining Laboratory

The Department of Mining Engineering at the University of Illinois at Urbana, Ill., is just completing a new mining laboratory 100x42 ft., divided into two equal sections; one for the treatment of ores and one for the washing of coal. The crushing end of the building contains an 18x20-in. Jeffrey coal roll, a Williams pulverizer, an Allis-Chalmers gyratory crusher, and a Colorado Iron Works 12x12-in. roll for ore. This end of the building also includes sample crushers and screens, and two steel sampling floors, one for ore and one for coal. The crushed material is elevated in a 15x20-in. continuous Peck carrier equipped to dump automatically along the upper run into any one of a row of steel bins, each holding five tons of coal. Beneath these bins is an Avery automatic traveling scale through which the material is delivered to any one of the screens or the washing or concentrating appliances. On the coal side there is a Holmes Brothers shaking screen and a Webster revolving screen, each fitted to separate four sizes and each about 13 ft. long. On the ore side is a vibrating screen. Beneath each of these screens is a set of bins from which the screened material is taken by wheelbarrows to a dormant scale and then delivered to the lower run of the Peck carrier which elevates it to the upper tier of bins. Through the automatic traveling scale the coal is delivered to a three-compartment American concentrator jig or to a Stewart jig. A Luhrig jig and a Jeffrey-Robinson cone washer will be added later. The washed coal is delivered into a 1300-gal. setting tank from which it is elevated by a Webster bucket elevator to an overhead bin and from thence carried by the Peck carrier delivered to a bin outside the building from which it is carted away to the boiler plant. The coal side of the laboratory has a capacity of five tons per hour.

On the ore side the material may also be crushed in a stamp battery. The fine-screened ore is mixed with water and delivered by a Traylor centrifugal sand pump to a three-compartment classifier, the products from which go to a 6-ft. Williams & Chalmers' vanner, an 11-ft. Traylor concentrating table and a buddle. These three machines deliver to four Callow tanks beneath which are drying tables. In the adjoining room is a completely equipped chemical laboratory and assay rom for carrying on such tests as are required. The equipment also includes an assortment of hard jigs, Munro classifiers, a spiral separator, a small Jeffrey-Robinson tub and a small laboratory concentrating plant made by the General Engineering Company. The machinery is being erected by the Burr Co. of Champaign, Ill.

The department is also equipping a new blasting and explosives laboratory, a rock-drilling and coal-cutting laboratory, and is building a new rescue station for giving training with oxygen helmets and other rescue appliances. The offices, drafting rooms, library, and recitation room of the Mining Department are located in the new Engineering Building which will be ready for occupancy Sept. 15. In this building there is also a completely equipped laboratory for the study of mine gases and safety lamps.

Pipe Lines as Common Carriers

WASHINGTON CORRESPONDENCE

A petition for an injunction against the orders of the Interstate Commerce Commission in the pending pipe line case has been filed with the Commerce Court by the Prairie Oil & Gas Co., a corporation of Kansas, doing oil business in Kansas and Oklahoma. The commission holds that the pipe lines are common carriers and as such are subject to the interstate-commerce act. It was, therefore, held that the pipe lines should file schedules of rates and should accept for transportation through their pipe lines oil of competing companies. The order of the Commission is to become effective Sept. 1 next. In bringing its petition to the Commerce Court the Prairie Co. says:

> Your petitioner has not now and never has had any schedule of rates and charges for the transportation of oil. It has never transported nor offered to transport any oil other than its own oil. Its corporation was procured, its stock prescribed and sold, for the purpose of engaging in a private business, in manner and form in which said business is now and heretofore has been conducted by your petitioner. That the stockholders and directors of the Prairie Oil & Gas Co. have never given their consent or in any manner authorized the managing officers of your petitioner company to divert the property owned by it or any part thereof from the necessary private uses in which it is now employed to the public service, or to the service of any other person, and the pipe lines of the Prairie Oil & Gas Co. cannot, nor can any part thereof be employed in the transportation of oil for the public or any private person without impairment and destruction of the value of the same to its owner as a necessary, economical and efficient means of carrying on, conducting and maintaining the business in which it is now engaged.

For these reasons it is requested that the order of the commission be set aside. This case was investigated by Commissioner Lane last summer and after it had been referred to the Interstate Commerce Commission it was decided that the pipe lines are common carriers. It was understood at the time that the existing pipe lines in the Southwest had exerted a harmful influence on the small producers of oil by refusing them a means of transporting their product to the markets. The commission thought that this was an injustice that should be corrected.

International Nickel Co.

The report of the International Nickel Co., for the 12 months ended Mar. 31, 1912, show earnings of $5,019,703, by the constituent companies, and other income, $69,263. From this administration expenses of $222,553 were paid, $497,520 allowed for plant depreciation, $139,782 for mineral exhaustion, $201,500 for bond sinking fund, $445,650 paid as interest on bonds, leaving as earnings applicable for dividends, $3,581,960. On the preferred stock, $534,749 (6%) was paid; on the common, $2,143,412 (18½%), leaving $903,799 to be carried to surplus, which now stands at $3,938,093. No details of operations are given.

Tin Lodes in Alaska

In addition to the Alaskan production of tin by dredging, lode tin mines have been opened near York, says the U. S. Geological Survey (*Bull.* 520-M). Production in 1911 was negligible, but promising results were said to have been attained, and development is being continued. It is hoped to smelt the concentrates at Seattle.

Gypsum Production in 1911

The gypsum production of the United States in 1911 was 2,323,970 tons, a decrease of 1.05% from 1910, according to the U. S. Geological Survey. The smaller old mills have been replaced by modern centralized units, so that prices on the finished products should ultimately be lower. Gypsum is produced in 17 states and in Alaska.

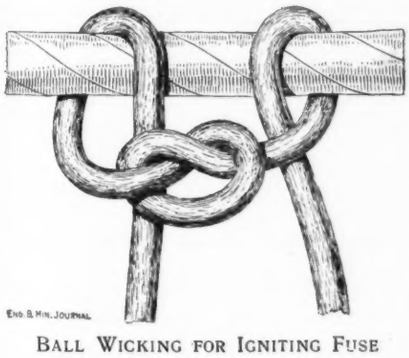
Details of Practical Mining

Accounts of Useful Ways of Doing Many Things in the Day's Work

Wicking Method of Lighting Fuse

In the Flat River lead district of southeastern Missouri stopes are carried with a top breast or heading that is reached from the floor of the stope by a steep-sloping bench, to ascend or descend which is a rather difficult task, especially for a miner who is hastening away from a round of lighted holes.

In order to somewhat delay the firing of the holes, without unnecessarily lengthening the fuses, it is the custom to light the fuses by wicking. This method consists in tying around the fuse a knot of ball wicking the strands of which have been soaked in oil. The knot is tied, as shown in the accompanying illustration so that it hangs straight down under the fuse, as also do the ends of the strands of wicking. Thus the flames rise and impinge upon the bottom side of the fuse



BALL WICKING FOR IGNITING FUSE

insuring ignition of the powder train within.

While it is claimed by some that the method of spitting a fuse is more rapid and surer, the delayed action obtained by the use of wicking gives the miner a better chance before the blast to reach a point of safety, when he is compelled to descend a sloping bench 40 to 60 ft. high or perhaps even higher.

The method of tying the knot in the wicking is clearly shown in the illustration. First a simple knot is tied in the middle of the strand, the two ends are then thrown over the fuse and brought back between the bight and fuse. The ends are then pulled tight, which draws the knot in the center of the strand close up under the wicking. The wicking is then ignited.

This method of igniting the fuse is somewhat similar to that used in the Calumet & Hecla mines in the Lake Superior copper district and has been developed in the Flat River district from the same force of circumstances, the necessity on the part of the miner to get away quickly from a round of lighted holes. However, in the Lake Superior country the snuffing method, as described in the JOURNAL of Nov. 18, 1911, is used, but the wicking method seems to be better because less trouble is experienced from air currents. In wicking fuse the miner should remember to concentrate the flame as much as possible below the fuse; this is the purpose of the knot. In this way the flame is kept under the fuse as long as possible and the ignition of the powder train within is assured.

Cold Water in Drifting

BY H. Y. RUSSEL*

When a vein is being developed by a tunnel, one does not expect to strike a flow of water that demoralizes the working forces for months, not only making it almost impossible to get men, but also making it difficult to get materials into the tunnel against the flow. Such a flow occurred in a tunnel in the West several years ago. This tunnel had been driven about 5000 ft.; several small veins had been cut but no water had been encountered, and no ditch had been made, the manager evidently thinking that no water would be encountered. The temperature at the breast of the tunnel was about 60° F., and although the only ventilation was from the compressed air, no difficulty was experienced getting into the tunnel even after a protracted shut down.

The course of the tunnel was west. To the north was a mine from which a flow of water, amounting to 2000 gal. per min., had been running for years. The tunnel was 400 ft. lower than the lowest mine workings and 4000 ft. distant. About 5100 ft. from the mouth of the tunnel a vein 4 to 7 ft. wide was cut, the vein filling, which consisted of mineralized gangue and quartz, was rather soft, the strike was northeasterly and parallel to the vein in the mine to the north. The tunnel at the intersection was about 1200 ft. below surface.

The tunnel company wanting someone to plan and carry out the development of the vein offered me the position of superintendent, and drifting along the vein in a northeasterly direction was started. From the first the vein was slightly wet but not at all bad. In places forepoling had to be resorted to and the square sets had always to be kept within 10 ft. of the breast; the ground was not heavy. When the drift on the vein had been driven 500 ft. a stream of water three inches in diameter was noticed running from the breast; as there was no pressure behind it we did not expect trouble. Two hours later we were engaged in a frantic struggle to prevent our dump buildings from being washed away by a heavy flow of water from the tunnel. On reaching the breast of the drift we found the water was pouring out of a hole about four feet above the floor. As we watched it the water broke through at the roof until finally all the water was coming from a hole 13 or 14 ft. above the track. Later measurements showed the flow amounted to 8000 gal. per min. The temperature of the water was 40° Fahrenheit.

Having planned the drift as the main working level for the vein, it had been driven 5½x8 ft. in the clear, this made a hole 8x11 ft. over all. After sizing up the situation we decided to ditch the tunnel as it was almost impossible to get a car in against the water, which was flowing from 5 to 10 in. above the rails. The ditch was made alongside the track; one hammer drill was used, and from 300 to 500 ft. of ditch was completed per week.

While the ditch work was going on efforts were made to shed the water back from the breast so that drifting could proceed. On account of the pressure, volume and, worse than all, the frightful coldness of the water, no one could work against it for more than a few minutes at a time, and as the temperature of the tunnel rapidly fell to that of the water one could not get warm, it being impossible to put in a dry house on account of the distance from the mouth of the tunnel and insufficient ventilation. The best we could do was to partly break the force of the water and shed part of it far enough back from the breast to allow some work to be done.

Our first plan was to use 2-in. planks, 8 or 10 in. wide as spiling, getting them close enough together to prevent the water from coming between them, and the ends as close as possible against the breast. On account of the force and weight of the water these planks had to be put in one at a time. When a couple of planks had been placed, thus confining the water slightly, the trouble began; as

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further planks were placed the water bent the toe of the planks down so that when the breast was reached the toe was from two to four inches below the next plank, leaving a space for the water to run through. This space was kept open by small rock and gravel lodging in it and making it impossible to close the gap. Frequently when the roof had been completed a rush of fine rock would choke the space between the spiling and the roof and the spiling would break down.

We then tried using 2x4-in. timbers set on edge, and the points sharpened to take in the inequalities of the breast. These were forced in one at a time and then spiked together. Owing to the roughness of the lumber and the points spreading when forced against the breast it was impossible to seal the cracks. The fine rock was forced into these cracks by the water, gradually widening them until most of the water came through. The only good the roof did was to break the force of the water.

An attempt was made to flume the water by building the entrance of the flume large enough to cover the hole from which the water came. It was found impossible, however, to hold the flume against the breast strongly enough to stand the water pounding and the occasional rush of fine rock. Many variations of these plans were tried, but I must say that nothing better than a makeshift was evolved.

As the staging had for a time to be removed when we blasted and as it took about one shift to put it up whenever it fell or was taken down, our progress did not create any enthusiasm among the directors.

The only men that could be obtained were those who were so badly broke that they had been thrown out of every boarding house in town and could get work nowhere else. No financial consideration was sufficient to get men to stay and the tunnel became a by-word in three counties.

In driving the drift one of our greatest difficulties was missed holes. The cold water froze the powder almost before it could be tamped. The lifters always missed. It was then necessary to grope under from one or two feet of ice water to find the holes, clear the collars, reprime and shoot. It frequently took several attempts before the primer would explode the frozen powder. Four or five shifts were usually necessary to shoot a round of six holes. Extra holes had always to be drilled to relieve the water pressure on the holes that were to be loaded.

When the flow was first encountered and came out of the top of the drift it was 12 ft. above the track. The height of the drift was reduced to 6½ ft. and an attempt was made to get past the water, or rather under it. Twice we succeeded and twice it came back into the breast. The last time it filled the drift with fine quartz for 30 ft.

It was then decided to continue the drift in the hanging wall alongside the vein. The wall, being fairly hard, stood up and most of the water stayed in the vein, coming out only where the change was made. As the drift in the wall was slowly pushed ahead it was noticed that large springs of water were breaking out of the floor close to the vein. As these springs increased the flow from above slackened until all the water was coming from below. The drift at this point was about 1500 ft. below surface. When the water started to come up the mine to the north became perfectly dry. The distance from where the water was first encountered to where it began to come up from the bottom was 200 ft. It took six months to drive the distance.

The flow continued at 8000 gal. per min. for about five months, then it gradually decreased until in 18 months it amounted to 2000 gal. per min., at which point it has since remained. The flow is slightly larger in summer than in winter. The temperature remains about the same.

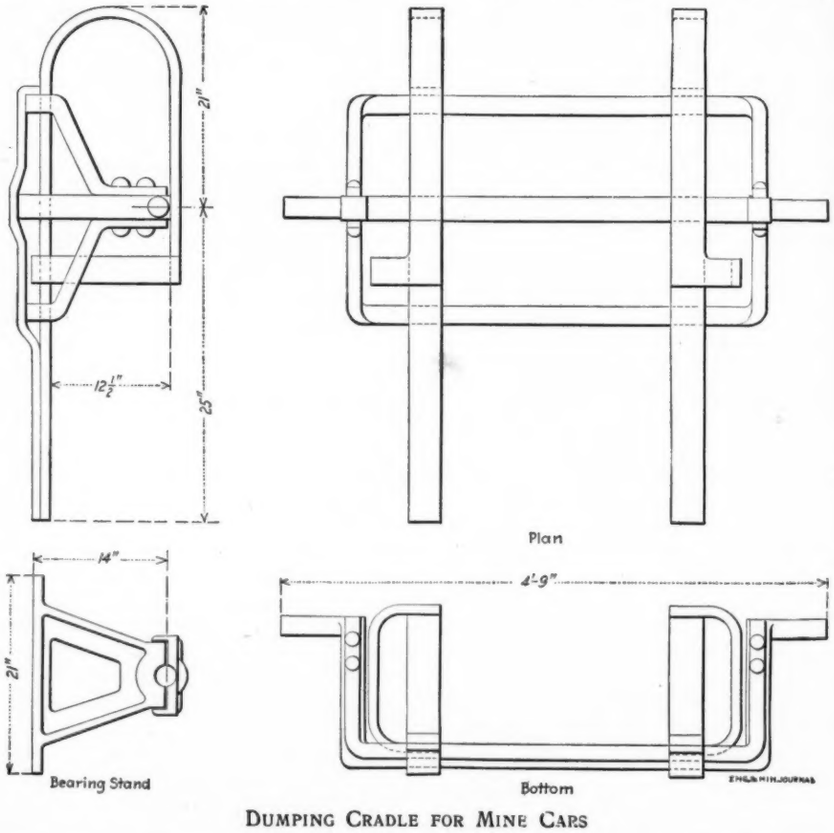
Many times in the years following this experience I have been ashamed of the crude methods that we used to handle the water and have tried to figure out a better, or I might say more scientific method, but I have never succeeded in doing so. Everlasting patience and perseverance seemed the only thing that counted.

Tipple for Mine Cars

By Claude T. Rice

A description of the car dump or tipple used at the mines of the Copper Range Co. in Michigan, was published in the Journal of March 16, 1912. That type of dump is designed for long cars and is not at all suitable for the mine cars generally used at metal mines in this country, where the length of the car is only a little greater than the height or the width.

In the accompanying illustration are shown the details of the car dump used at the Doe Run, the St. Joseph, the Federal and at some of the other mines in the Flat River district of Missouri, where the ore is hoisted to the surface in cars. This tipple is made entirely of iron, and as shown in the drawing, is designed for dumping a 1-ton car.



Dumping Cradle for Mine Cars

The iron bars that serve as rails run back to a sole plate under the track rails leading up to the dump so that the bars will come flush with the tops of the rails. The other ends of these bars are bent and brought back far enough to come over the tops of the back wheels when the car has been run forward on the dumps. To strengthen these tops or retaining straps, they are tied to the lower part by two straps.

The dump is so proportioned that the center of gravity of the loaded car will be slightly ahead of the shaft of the dump, when the car is pushed ahead so

that the front wheels are engaged by the front loops, yet not far enough ahead but that, after the ore has run out, the weight of the back rails of the dump will be enough to put the car and tipple back into a horizontal position. Consequently the proportions have to be made according to the dimensions of the cars used. The drawing shows only the general design of a style of tipple that has given excellent service after years of use. To prevent the tipple or dump from going too far around for it to right itself, a chain is tied to the back and is fastened to the floor above the bin into which the ore is being dumped.

This tipple is used at the surface as well as underground where the ore is dumped into skip pockets. The dump is strong; that is the essential requirement of a good tipple. This type of dump has been found to be more satisfactory on account of its quick action than any rotary style of dump as such dumps give endless trouble because of greater complexity of design and the rack and strain that they have to undergo.

A rotary type of tipple was tried several years ago in the Flat River district for dumping single cars, but the dump worked too slowly and considerable trouble was experienced in cold weather on account of the guide wheels becoming coated with frozen mud, which made the turning of the tipples by hand difficult.

Automatic Call System

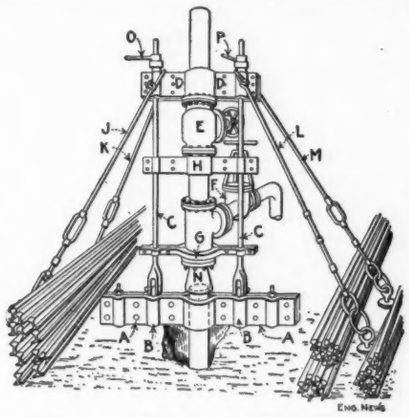
At the plant of the St. Louis Smelting & Refining Co., in the Flat River district of Missouri, an automatic call system manufactured by the Autocall Co., of Shelby, Ohio, is used. Electric call bells are placed about the plant at the most favorable places for attracting the attention of the officers of the company. The heads of departments and other men that have to be called frequently are designated by numbers.

When a certain man is wanted the telegraph operator is called; he plugs the number of the man wanted on the call board, thus setting all the bells in the system to ringing that signal. Either the man wanted or some one who knows the call hears it so that the man sought is soon reached and he rings up on the nearest telephone.

These call bells are operated by storage batteries. The system is well liked at this property, and seems to have a special field at mines where the workings are scattered, and where it is frequently necessary to summon heads of departments quickly. The bells ring loudly so that the sound carries a long distance.

Closing a Spouting Oil Well

Closing a well which is spouting a heavy flow of oil under high pressure is a difficult problem which has had to be solved many times on the oil fields of this country. *Engineering News* has published a description, abstracted from the *Engineer,* May 17, 1912, of the method employed to close such a well at Potrero del Llano, Vera Cruz, Mexico. The well was spouting for 108 days, and it is estimated that about 10,800,000 bbl. of oil were discharged before the well was closed; all of this was lost, except about 3,000,000 bbl. held in a temporary reservoir. The oil was struck at a depth of 1900 ft., and the flow rapidly increased



METHOD OF CLOSING A "GUSHER" IN A MEXICAN OIL DISTRICT

from 10,000 to the enormous amount of 160,000 bbl. per day. The device used to close the well is shown in the accompanying sketch, and is described as follows:

In the well was about 1700 ft. of 8-in. casing. First of all a heavy clamp in halves was placed so as to embrace the top of this casing where it projected above ground level. This clamp *A A* carried two eyes *B B* which were used as hinges for two 2-in. rods *C C*, the upper ends of which were threaded. The upper ends of these rods were passed through a clamp *D D* above an 8-in. T-piece, which was provided with two 8-in. stop valves *E* and *F*, one being on an arm of the tee and the other on the tail. Two other clamps *G* and *H* embraced the T-piece so as to give increased rigidity. The top clamp *DD* was provided on both sides with hooked tie-rods *J, K* and *L, M;* these were hitched to turnbuckles, the lower ends of which were connected to anchorages of concrete firmly embedded in the ground and weighted down with many tons of rails. At the lower end of the arm of the T-piece, which it was intended should finally come above the orifice of the well, was fixed a short length of pipe *N* tapering from 10 to 8 inches.

When all was ready the apparatus was laid on its side in correct position near the well, and by the aid of guy ropes was gradually raised until vertical over the spouting bore hole. The valve *E* was kept open so that there was unobstructed egress for the oil. By the spanner levers *O* and *P* the nuts on the threaded rods *C C* were tightened gradually, and the taper nipple *N* was gradually brought down over the well casing, packing being inserted so as to make the joint as tight as possible. The operation was entirely successful. When the valve *E* was gradually closed and the valve *F* opened, the oil was found to be under control and could be diverted into the reservoir.

The apparatus had been tested to a pressure of 800 lb. per sq.in., and as the pressure in the well was thought to exceed this, it was decided to install another apparatus with pipes and valves tested to 2000 lb., since it was deemed unwise entirely to close the well with the weaker apparatus. This was successfully done, and now the well can be entirely closed if desired, and there is, apparently, only a slight leakage at the joints. The pressure when the well is closed is 825 pounds.

By the first apparatus the flow was immediately reduced to 8000 gal. per day, and was kept at this rate until proper storage could be provided. The temporary storage reservoir referred to above was more than 60 acres in extent, but in 60 days this was filled with 3,000,000 bbl. of oil, though the flow was checked as much as was deemed advisable.

Hook for Hauling Timbers

The accompanying sketch shows a simple hook that may be quickly attached or detached from the hoisting rope in moving timbers through a drift or up a winze. The device consists of hook and link; the back end of the hook being enlarged, shaped like a cam, and toothed.

DETACHABLE HOOK FOR HAULING TIMBERS

When the rope is passed through the link and the hook is straightened by the load, the toothed cam seizes the rope and pressing it securely against the link holds it tightly until the load is released or the hoisting rope is slacked off. This hook can be attached or detached quickly and in some places will prove to be more convenient than the slower method of tying hitches or knots.

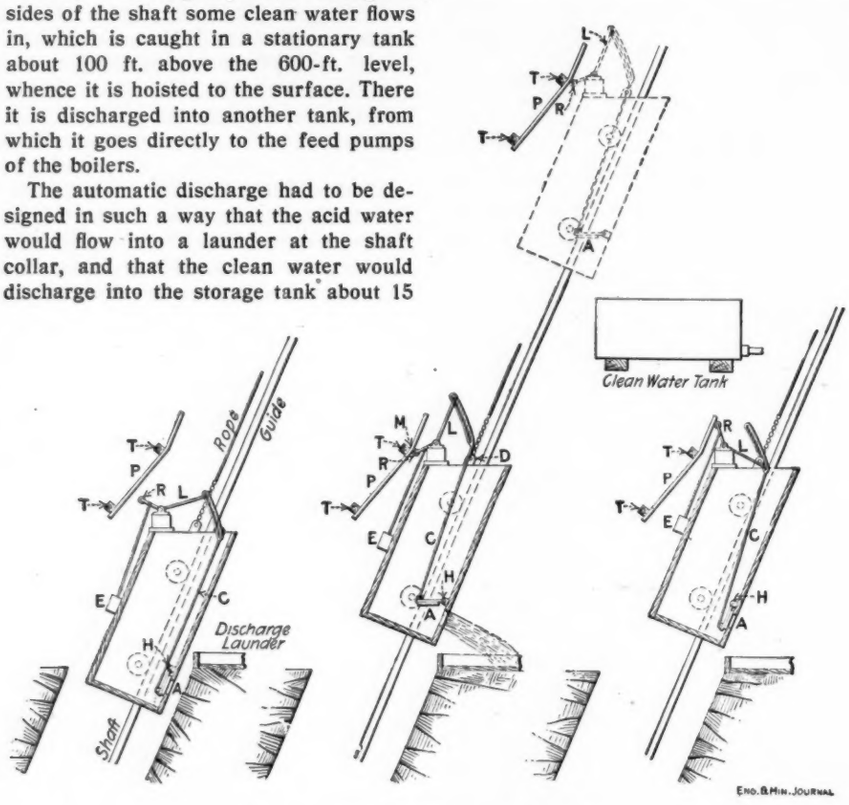
Deflection of drill rods is more apt to occur in a vertical or horizontal hole than when the hole is inclined at right angles to the dip of the strata, as it has been found that rods have a tendency to turn in a direction at right angles to the strata.

Self Discharging Bailing Tank

By M. G. Sohnlein*

At the Maestro shaft of the mine "Socavon de la Virgen" in Oruro, Bolivia, the water is bailed with tanks of 400 gal. capacity. The water contains a considerable amount of acid and sulphates so that the tanks have to be constructed of wood. The vertical depth of the shaft is about 600 ft. and the flow of water amounts to 5500 gal. per hr. Along the sides of the shaft some clean water flows in, which is caught in a stationary tank about 100 ft. above the 600-ft. level, whence it is hoisted to the surface. There it is discharged into another tank, from which it goes directly to the feed pumps of the boilers.

The automatic discharge had to be designed in such a way that the acid water would flow into a launder at the shaft collar, and that the clean water would discharge into the storage tank about 15 ft. higher. The same bailers are used for either acid and clean water and at the beginning of the shift a few buckets of fresh water are first hoisted.



Bailer for Raising Acid Water

The arrangement can be readily understood from the accompanying sketches: *A* is the valve hinged at *H*. As soon as the roller *R* strikes the plank *P* which is placed a little more inclined than the shaft, the lever *L* is lifted and the valve is opened by the connecting rod *C*, Fig. 1. At the point *M* the valve has reached its largest opening. The upper part of the plank, which is connected with the lower part with angle irons, is placed at the same inclination as the shaft. If the tank should be lifted a little higher, as frequently occurs, the roller travels on this part of the plank, keeping the lever in the same position as it has at *M*, and consequently the valve stays wide open until the roller leaves the plank, when the lever falls back, shutting the valve. By placing another plank higher up, the discharge of clean water is led into the tank, shown dotted in Fig. 2. When hoisting fresh water the engineer passes the first plank quickly so the valve only opens for a very short time and but a small quantity of the water is lost.

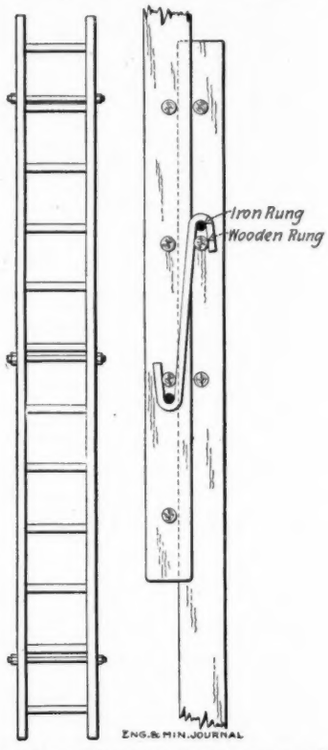
When lowering again the roller has to pass the first plank. Therefore the fork at the end of the rod *C* is slotted over such a distance that the bolt which connects the rod and the lever can slide through this fork until the roller comes into such a position that it freely passes the plank, shown in Fig. 3. After leaving the plank the lever is brought back into its proper position by the counterpoise *E*. The latter arrangement also makes the apparatus safe against overhauling. Even if the engineer should hoist the tank so high that the roller leaves the plank entirely, he can lower again and then hoist it to its proper position. Further construction details can be easily understood from the sketches. The lever is curved to prevent its striking against the distance piece *D* in the tank. The same applies to the bend in the rod *C*. The planks are fixed to the timbers of the headframe with crosspieces *T*. This arrangement has been in satisfactory use at the shaft for several months.

*Care of Cia. Minera de Oruro, Oruro, Bolivia, S. A.

Method of Hanging Ladders

When ladders are required only for temporary use in raises and millholes in the mines of the Copper Range Co., in the Lake Superior country, it is the custom to use several 12-ft. ladders; the lower one rests upon the ground while each of the others is carried by ⅝-in. round-iron, S-shaped hooks from the ladder below, as shown in the accompanying sketch.

The ladders are made of oak with 2x4-in. legs and rungs 1½ in. in diameter spaced one foot apart. Three tie-rods are used; one at the center; one below the second rung from the bottom; and one above the second rung from the top. The S hooks grip the ladders by the tie-rods and the ladders overlap at the junction. It is better to place the overlap of the lower ladder on top of the upper one as that arrangement makes it easier for a man coming down to know when he has come to a junction.



Method of Hanging Ladders in a Raise

A temporary sollar is usually put in the raises at intervals of every two ladders whenever three or more ladders are used. Sprags are used to prevent side swing. The overlap is so long that there is no danger of hinging of the ladders at the junctions.

The tendency for diamond-drill rods to deflect at a certain point in the hole being drilled is often overcome by cementing the hole to a point slightly above the troublesome one and by drilling through this solid cement.

Details of Metallurgical Practice

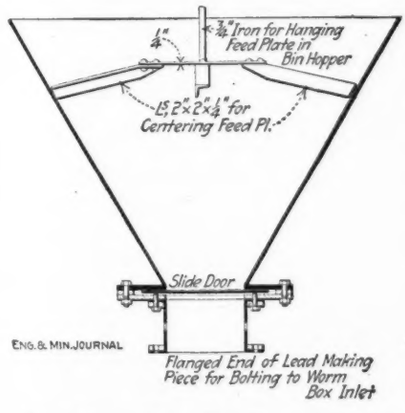
Records of Experience in Ore Dressing, Cyaniding and Smelting

Dry Tube Milling

BY H. T. DURANT*

In some milling operations it is necessary to crush the ore while dry, in all the various stages up to, and including the final tube milling. In such cases unless the moisture in the tube-mill feed be carefully watched the output of the mill will be seriously affected, or the mill may become more or less clogged.

In a particular case the ore came from the calcining furnaces and was allowed to cool before being sent to the tube mill bin; this roasted ore was of a hygroscopic nature, and experience showed that if the required fineness of the product were to be maintained the output of the tube mill had to be halved when the moisture in the feed rose to about 1%. At one time the moisture in the


¼"
⅜" Iron for Hanging Feed Plate in Bin Hopper
15, 2"×2"×¼" for Centering Feed Pl.
Slide Door
ENG. & MIN. JOURNAL
Flanged End of Lead Making Piece for Bolting to Worm Box Inlet

FEED HOPPER FOR DRY TUBE MILLING

mill feed was unfortunately allowed to rise to more than 1½%. After about six hours running, the interior of the mill began to "make up" or to become lagged with ore in which the pebbles were firmly embedded, the whole mass adhering to the mill liners; this naturally reduced the working diameter of the mill and put most of the pebbles out of action. This lagging up of the interior of the mill is, of course, gradually evident from the change in the sounds during running. The clearing of the mill is not easy, especially when it has only one manhole door. The mill slowly cleans itself if fed with sharp dry sand.

Dry tube milling need not be dusty work if the feed and discharge ends are well arranged. Where the feed end consists of a horizontal worm box feeding through the hollow trunion, as shown in the accompanying sketch, the flanged intake on the upper side of the worm box can be set a few inches vertically below the discharge end of a hopper-bottom bin of any convenient size, such as one to hold a 24-hr. run. At the bottom of the hopper bin will be the ordinary slide gate for regulating the feed, and between this and the intake of the worm box will be flanged and attached by setscrews to a short making-up piece made of about 10-lb. sheet lead; this will be more convenient than a stuffing box.

By this method of construction it will be found that, since the bin itself may settle or rise ever so little with its varying loads, the line of the worm box will not be affected, as the lead making-up piece connecting the bin to the worm box will respond more readily than a stuffing box could.

A 1-in. hole should be made in each of two opposite sides of the lead making-up piece. These can be closed with corks or other plugs. When adjusting the feed by the sliding gate which is just above this lead making-up piece, it is an advantage to be able actually to see the feed, and this is easily done by removing both corks and placing an electric light at one hole, then looking through the other.

A steel feed plate, centrally hung in the hopper portion of the bin at about two feet above the slide gate and centered by four short pieces of angle iron riveted to it, will insure a steady feed from the bin to the worm box without any chance of the ore in the feed bin blocking or bridging. If the cross-section of the hopper at the level of the feed plate is three feet square, then the plate itself will be about 14 in. square. It is advisable to guard the entry to the tube-mill feed bin by screens, so that under no circumstances can anything enter it which is too large to be easily passed along by the feed worm.

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Chemical Consumption at the Liberty Bell Mill

At the Liberty Bell cyanide plant, Telluride, Colo., the consumption of chemicals is as follows; cyanide, 1.2 lb.; zinc, 0.487 lb.; lime, approximately 7 lb.; lead acetate and litharge, 0.415 lb.; and sulphuric acid, 0.076 lb. per ton of ore milled.

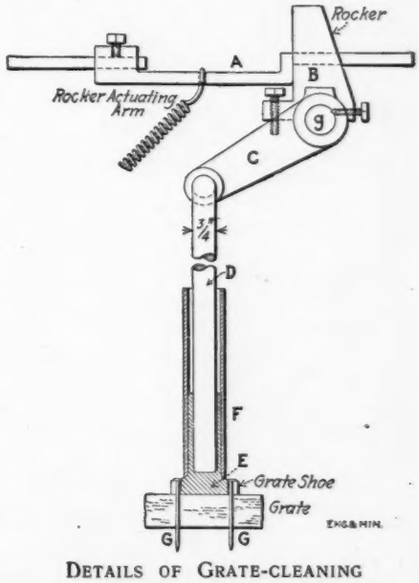
Device for Clearing Jig Grates

After the zinc-lead ore from the mines of the Joplin district is crushed, the broken pieces may be classified according to composition, as follows:

(1) Nearly pure metallic minerals that constitute the major portion of the concentrates.

(2) Gangue nearly free from metallic minerals and which is discarded as waste.

(3) Valuable metallic minerals and worthless gangue in approximately equal proportions.



DETAILS OF GRATE-CLEANING MECHANISM

Pieces of ore of the last mentioned class are known as "chats." The gangue is chert, which breaks into angular fragments and therefore the chats are more angular than the pieces of nearly pure metallic mineral.

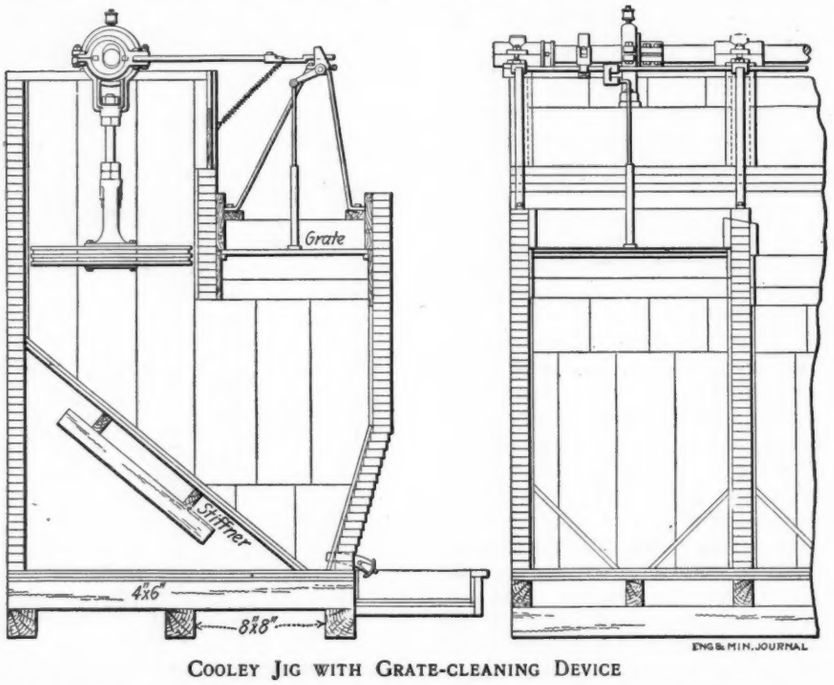
The chats, because of the angular shape, clog jig screens to an annoying degree. Therefore in most of the Joplin mills, cast-iron or wooden grates are used in lieu of screens to support the bed of material in the jigs. The cast-iron grates are made as long as the jig compartment is wide, and about six inches in width. But even the grates become clogged by the chats, making it necessary to dig down into the beds to dislodge the caught particles about once per hour. This is often done by inserting a blunt chisel-like tool about two inches wide through the bed and into the slots of the

grates. This operation is known as spudding.

As the mill attendants are inclined to neglect this work, S. C. Byrd and C. Pierce have devised and patented an automatic spudder. As shown in the accompanying sketch, the device is held in place by two 60-d. nails that pass through holes in the shoe and extend down into the open spaces between the bars of the grate. A 1-in. pipe *F*, 18 in. long, fits snugly over the upper extension of the shoe *E*, forming a cylindrical chamber in which a ¾-in. rod *D* moves up and down. An eccentric on the jig shaft moves the horizontal arm *A*, which engages the rocker *B*, mounted on a shaft *G*, that is supported by bearings mounted on the partitions between the cells of the jigs in such a manner as not to interfere with the flow of pulp. The rocker *B* actuates the rod *D* by the arm *C*, which is fixed to the rocker shaft *G*. When the eccentric is approaching its position of maximum forward throw, the shoulder on the arm *H* engages the rocker *B*, causing it to move outward and to lift the arm *C* and the rod *D* upward.

As the eccentric turns past that position, the shoulder on the arm *A* is withdrawn from the rocker *B*, so that it returns suddenly to its normal upright position, permitting rod *D* to drop freely upon the grate at the time that the plunger of the jig is making its downward or pulsion stroke. The jar of the rod dropping on the grate loosens the chats caught in the slot, so that the upward flowing current of water will carry them up into the bed.

The throw of the eccentric is about one inch. A spring is attached to the arm *A*, as shown in the illustration, to prevent chattering of the arm in the slot of the rocker. So far the device has been used only on the roughing jigs, no attempts having been made to use it on the cleaning jigs that are operated at greater speed. The area of each compartment of these jigs is 36x48 in., and eight grates are required for each compartment. One arm *C*, one rod *D* and its shoe *E* are required for each grate, but not only one eccentric, one arm *A* and one rocker *B* are needed for each compartment.



COOLEY JIG WITH GRATE-CLEANING DEVICE

Electrically Driven Crushers

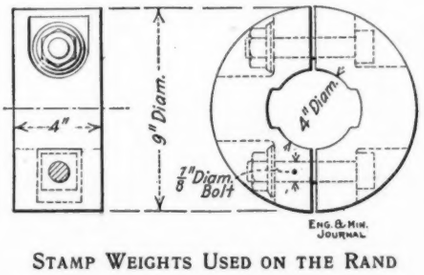
In the operation of a mine one of the most important machines used is the crusher. In these days when extensive use of electricity is being made in mines it is of interest to cite defects which were experienced in connection with the operation of some electrically driven crushers, owing to the fact that it was somewhat difficult to determine accurately the actual power that would be required.

As originally installed there were two crushers each driven by a 15-hp. motor. The installation was designed to crush to about three inches, but in order to get more ore through the mill the jaws were afterward closed to one inch and it was then discovered that considerable overload was thrown upon the motors, to an extent which was hardly appreciated at the time. Evidence, however, of the severity of the work was soon forthcoming in the shape of trouble from coils burning out, and if the feed was continuous, it was found that the motors were actually slowed down. This trouble persisted until, owing to the fact that the mill was being seriously handicapped because of lack of ore, it was decided to take out the overloaded motors and substitute for them motors of exactly double the power. This cured the trouble so far as the electrical portion of the equipment was concerned, inasmuch as the motors were then well able to stand up to their work, but the trouble was only transferred to another part of the mechanism, for it was then discovered that too many shafts were bent on the crushers owing to the torsional strains.

In order to overcome this second difficulty the keys were taken out of the driving pulleys and shear-bolts put in their place in order to make the provision that if the crushers became choked or were fed too quickly the bolts would be bent or sheared, thus saving the shafts. By this additional safety device the crushers could be operated at a high speed and crush to one inch with comparatively few interruptions of any serious magnitude or duration.

Compensating Weights for Stamps

Stamp shoes gradually wear away, and on account of breakages, the stems become short, and also the heads or bosses are worn by abrasion of the pulp in the water box, all of which cause the stamps to lose weight. Compensating weights are often used to make up for the decrease in weight in order that the full crushing capacity may be maintained. The early forms of these compensating weights were crude in design, and often a head was placed upon the top of the stem above the upper guide or an extra tappet was used above the one by which the stamp was lifted.



STAMP WEIGHTS USED ON THE RAND

A simple type of compensating weight is described by G. O. Smart, in "A Text-Book of Rand Metallurgical Practice." These compensating weights consist of a split disk, which weighs about 60 lb. and is of the same diameter as the tappet. These weights are clamped with a bolt on either side of the stem, and placed as low down as possible. If a compensating weight be placed above the tappet, it is useful in taking the place of the tappet-set formerly employed when altering the height of stamp drop. Since the use of compensating weights in a 200-stamp mill will increase the crushing capacity by 10 to 20 stamps, it is obvious that the small amount of additional labor and trouble required in using them is well repaid by the advantages gained.

The Cost of Doing Things

Data from Mining and Metallurgical Practice

Quicksilver Consumption at Alaska Mills

At the Alaska Treadwell 240-stamp mill during the year ended May 15, 1911, as stated in the annual report, 75,345 oz. of quicksilver were used in milling 395,332 tons of ore; 69,077 oz. being used at the batteries, 5670 oz. on the plates and 598 oz. at the vanners. This is equivalent to one ounce of quicksilver to 5.18 tons of ore. The quicksilver loss amounted to 36.08% of the total used, or approximately one ounce for every 14.5 tons of ore milled; 99% was reported as lost in the mill and the remainder in retorting. The total supply of quicksilver including that reported on hand and received from retort and store amounted to 93,088 oz. or about one ounce for every 4.25 tons of ore milled. Expressed in ounces of quicksilver per ton of ore, the average feed was as follows: To the batteries, 0.1747 oz.; on the plates, 0.0143 oz.; and at the vanners, 0.0015 oz.; a total of 0.1905 oz. of quicksilver per ton of ore. On the basis of gold contents one ounce of quicksilver was fed for every $7.53 of free gold recovered.

At the 300-stamp mill of the same company and during the same period, 83,234 oz. of quicksilver were used in milling 374,752 tons of ore of which 67,180 oz. were fed on the batteries; 6697 oz. on the plates; 448 oz. on the vanners and 8909 oz. used in cleaning amalgam. This is equal to about one ounce of quicksilver for every 4.5 tons of ore treated. The quicksilver loss was 30,956 oz. or 37.19% of the total used, which is equivalent to one ounce for every 12.1 tons of ore, approximately 99% of this loss occurred in the mill and 1% in retorting. The total supply of quicksilver from all sources was 99,907 oz. or almost one ounce for every 3.74 tons of ore treated. The feed to the batteries equaled 0.1792 oz. of quicksilver per ton of ore; to the plates, 0.0179 oz.; to the vanners, 0.0012 oz.; and in cleaning amalgam, 0.0238 oz. or a total of 0.2221 oz. per ton of ore treated. One ounce of quicksilver was fed for every $6.13 of free gold recovered.

At the Ready Bullion Claim mill of the Alaska United during 1911, 48,425 oz. of quicksilver were used in milling 223,668 tons of ore which is equal to about one ounce for every 4.6 tons of ore treated, or 0.2165 oz. of quicksilver per one ton of ore of which 0.1787 oz. were used at the batteries, 0.0079 oz. on the plates, 0.0031 on the vanners and 0.0268 oz. in cleaning amalgam. The total supply of quicksilver from all sources was equivalent to about one ounce for every 2.7 tons of ore treated and the loss was 35.51% of the total used, or one ounce for every 13 tons of ore milled, practically all of which was lost in the mill, only 240 oz. being lost in retorting.

The 700-Ft. Claim mill belonging to the same company and operating during the same period used 39,990 oz. of quicksilver in treating 215,666 tons of ore, or one ounce for every 5.15 tons of ore treated. The loss was equivalent to one ounce for every 21.3 tons of ore or approximately 24.10% of the total used. The amount fed at the batteries was 0.1138 oz. per ton of ore; on the plates, 0.0164 oz.; at the vanners 0.0018 oz. and in cleaning amalgam, 0.0534 or a total of 0.1854 oz. per ton of ore. The total supply from retorting, store, and that on hand was equal to one ounce for every 3.7 tons of ore treated.

The Alaska Mexican mill used 51,743 oz. during 1911 and crushed 236,383 tons of ore. The total amount fed equaled 0.2189 oz. per ton of ore of which 0.1731 oz. were fed at the batteries, 0.0114 oz. on the plates, and 0.0344 oz. used in cleaning amalgam. The total amount used is equal to about one ounce for every 4.56 tons of ore treated and the loss was 27.37% of the total fed, or one ounce for every 16.7 tons of ore. The supply was equivalent to one ounce for every 3.57 tons milled.

Sons of Gwalia

The directors' report and statement of accounts of the Sons of Gwalia, Ltd., for the year ended Dec. 31, 1911, states that 165,664 tons of ore were treated at a total cost of $5.13 per ton, made up of $1.01 for development, $2.16 for ore extraction, $1.57 for treatment, 37c. for general expenses, 8c. for bullion charges, making a total of $5.19 per ton from which 6c. is deducted for rebate on stores.

Development work consisted of 7802 ft. of drifting, sinking, raising, etc.; 9400 cu.ft. of flat cutting and shaft bins and 1050 ft. of diamond drilling. The main incline shaft was sunk 199 ft. at an average cost of $106 per ft.; drifting 3759 ft. cost, $18.09 per ft.; crosscutting 1449 ft., $18.20 per ft.; raising 1086 ft., $16.05 per ft.; sinking 1309 ft. of winzes, $20.63 per ft.; and 1054 ft. of diamond drilling, $4.32 per ft. drilled. Ore extraction or stoping was made up as follows: Breaking ore, including ore from development, $1.15 per ton; filling stopes, 25c. per ton; and trucking and haulage, 76c. per ton.

Treatment charges consisted of 9c. for rock breaking, 3c. for ore transportation, 28c. for milling or stamping; 6c. for concentration per ton of ore, or $4.24 per tons of concentrates; 36c. for slime treatment by filter process per ton of ore, or 75c. per ton treated; 3c. per ton of ore for fine grinding of concentrate or $1.93 per ton of concentrates ground; 3c. per ton of ore for cyaniding by agitation, or $1.92 per ton handled; 27c. per ton of ore for cyaniding by percolation, or 56c. per ton treated; 24c. per ton of ore for fine-grinding sand, or 46c. per ton of sand ground; 1c. for filtering concentrates per ton of ore, or 44c. per ton of concentrate handled; 14c. for disposal of residues per ton of ore and 3c. for precipitation, smelting and slag treatment. The general expenses were composed of salaries and wages, 16c. per ton of ore; miscellaneous, 12c.; maintenance and supplies, 1c.; and rent and insurance 8c. per ton of ore. The average yield of the ore was 0.426 oz. of gold per ton of ore milled. The mill consists of 50 stamps which ran 97.83% of the total time during 1911, crushing 9.278 tons per stamp per day.

Briseis Company, Tasmania

According to the annual report for 1911 of the Briseis Tin & General Mining Co., Derby, Tasmania, 418,000 cu.yd. of drift were sluiced in the recovery of 573 tons of black tin which produced 414 tons of metallic tin. This means that approximately 730 cu.yd. of dirt are sluiced for every ton of black tin recovered and that it takes one ton of black tin to equal 0.723 ton of metallic tin. The average net price received for metallic tin during 1911 was approximately $903 per ton. The average daily supply of water during the year was 129 sluice heads, each equivalent to 24 cu.ft. per min. or a total of 21,500,000 gal. of water per day. From this it may be estimated that it requires about 18,500 gal. of water to sluice one cubic yard of dirt.

The cost of producing tin was £21.11 per ton of black tin or £29.173 per ton of metallic tin. According to the figures stated it costs £21.11 to sluice and treat 730 cu.yd. of dirt (the average amount of dirt required to produce one ton of

black tin) which is equal to about 14c. per cu.yd. made up as follows: 46.4% for sluicing, hydraulicking, cleaning reef, breaking, wheeling and stacking fallen overburden and modern alluvial; 12.3% for extending pipes and races in faces, erecting elevators and maintenance; 2.9% for cleaning up, dressing and bagging; 5.1% for electric lighting; 6.1% for maintenance and repairs to race heads; 5.2% for general supplies, timbers and explosives; 11.2% for pumping, repairs and renewals to plant and other general expenses; and 10.8% for salaries to staff, foremen, shift bosses and general office expenses.

The charges for cartage, freight, etc.,

RECORD OF FOUR GOLD DREDGES IN TASMANIA

Dredges	No. 1	No. 2	No. 3	No. 4
Running time, hr.	5,332	4,974	5,652	1,786
Turnover, cu.yd.	311,750	299,500	577,450	141,950
Turnover per hr., cu. yd.	58	60	102	79
Average depth, ft.	39	24.5	32.3	18
Gold won, oz.	1,173	1,726	1,968	731
Contents per cu.yd., grains	1.8	2.8	1.6	2.5
Contents per cu.yd., pence	3.49	5.34	3.16	4.77
Running expenses, £	4,216	4,026	5,083	1,554
Cost per cu.yd., pence	3.25	3.23	2.11	2.63
Details of cost				
Actual dredging, pence	1.033	1.055	0.700	1.146
Fuel and feedwater, pence	0.615	0.552	0.400	0.393
Upkeep of plant, pence	1.012	1.195	0.780	0.550
Supervision, pence	0.158	0.165	0.099	0.196
Other work, pence	0.428	0.259	0.134	0.343

were equivalent to $37 per ton of metallic tin shipped. On the Ringarooma section 354,000 cu.yd. of overburden were removed at an average cost of 12.8c. per cu.yd., compared with an average cost to date of 11.98c. for removing 1,525,500 cu.yd. of overburden. The smelting loss is figured at two units per ton of metallic tin which indicates that the black metal was dressed up to 74.3% metallic tin at the mines.

Gold Dredging

In the accompanying table is given a record of four dredges operated by the company on its Wallace property. The total turnover was, 1,330,650 cu.yd.; average value per cu.yd., 3.90d. To the running cost must be added lease rents, commissions to landowners, lease surveys, rates, legal expenses, etc., 0.28d., making the total cost 4.18d. per cubic yard.

Smelting and Refining Copper

The 13th census of the United States shows that in 1909, 16,832 men were engaged in the smelting and refining of copper. Of this number 275 were officials, 929 clerks, and 15,628 wage earners. Officials equaled 1.6% of the whole, clerks, 5.5%; and wage earners, 92.8%, of whom 99.9% were males, and 0.1% under 16 years of age. There were 38 companies engaged in the industry in 1909, 84% reporting a production amounting to $1,000,000 or over, or 99% of the entire production, as compared with 40 concerns in 1904, of which 77.5% made a production valued at $1,000,000 or over, and 99% of the total production. The total horsepower reported used by all concerns was 158,126. The expense for smelting and refining was divided as follows: Salaries, 0.7%, wages, 38%, materials, 94.4%; and miscellaneous expense, 1.1 per cent.

Greene-Cananea Costs

The 1911 anunal report states that the cost of operations at Cananea, Mexico, was as follows:

The 1911 cost of mining, $2.46 per ton, compares with $2.75, $2.22, $2.13 and $3.28 for the four previous years. Included in the mining cost for 1911 is 51,784 ft. of development, of which 696 ft. was shaft sinking and 9811 ft. raises and winzes. The average cost was about $8 per ft. for development work. The cost of concentrating 528,412 wet tons of ore was 72.2c. per ton, of which 7.6c. was for improvements and betterments. The total ore treated consisted of 78.5% company ore, concentrated at the ratio of 2.4 : 1 and the remainder, custom ore, at the ratio of 5.17 : 1.

MINING COSTS PER TON OF ORE

Mine	Tons	Stoping	Development	Dead work and surface expense	Total
Puertecitos	6,505	$3.373	$4.561	$1.976	$9.910
Henrietta	16,796	1.984	1.946	1.240	5.170
Elisa	58,771	2.020	1.303	1.013	4.336
Capote	75,425	1.318	0.528	0.999	2.845
Oversight	394,389	1.010	0.138	0.331	1.479
Veta Grande	237	1.562	...	...	1.562
Kirk	95,059	1.738	1.183	0.864	3.785
Cobre Grande	22,669	1.313	0.540	0.843	2.696
60% S de Cobre	81,611	1.446	0.736	0.556	2.738
	751,462	$1.311	$0.557	$0.592	$2.460

The cost of reduction per dry ton of new copper-bearing material was as follows: Sampling, 2.22c.; bedding, 5.84c.; reclaiming, 2.02c.; blast-furnace costs, $1.4055; reverberatory cost, 31.97c.; calcining costs, 5.10c.; converting costs 65.18c.; indirect custom ore costs, 3.51c.; flux, 0.71c.; making a total of $2.571 per dry ton of new copper-bearing material treated. The total tonnage treated was 580,060 tons. Owing to the grade of matte being lower than formerly the converting department was congested and the amount of by-products to be handled greatly increased, the total cost of smelting was not lowered to $2.25 per ton as predicted in the 1910 annual report. The cost in previous years, to 1907 inclusive, was $2.69, $3.09, $3.86 and $6.82 respectively, per ton.

The cost of McDougal roasting was 40c. per dry ton, made up of sampling, bedding, and reclaiming, 12.62c.; operating furnaces, 18.94c.; transportation of calcines, 2.28c.; and general expenses and flux, 6.19c. per ton. Of the total charge to the reverberatories, 113,782 dry tons, 36.2% was flue dust, 58.5% calcines, 4.25% siliceous ores and 1.05% flux. An average of 1675 lb. of calcines was produced per ton of concentrates. The total cost at the reverberatory furnaces per ton of charge was: Labor, operating, 29.82c.; labor, repairs, 15.47c.; shop expense, 1.51c.; supplies and material, 20.70c.; power, 0.95c.; fuel oil, $1.4882; flux, cost of, 2.23c.; and sundry expense, 5.66c.; making a total of $2.2516 per ton, from which a steam credit of 82.45c. was deducted, making a net operating cost of $1.4271 per ton; and a construction charge of 22.32c. per ton for rebuilding No. 1 furnace and flue makes the total net cost $1.6503 per ton of charge.

The cost per indicated horsepower was $5.568 against $6.54 in 1910. The total cost of mining and treatment, up to and including the sale of refined copper, per ton of ore has been as follows: In 1906, 947,977 tons, $10.210 per ton; 1907, 1,305,291 tons, $7.625; 1908, 295,554 tons, $5.976; 1909, 835,929 tons, $5.459; 1910, 792,856 tons, $5.765; and in 1911, 741,873 tons at $5.257 per ton. Included in the 1911 cost is 37.7c. per ton for construction repairs and replacements of all kinds.

The total cost per pound of refined copper, including all expenses, was 11.666c., made up of 9.568c. for mining, milling and smelting; 0.755c. for construction; and 1.343c. for freight on copper to New York, refining, marketing, etc. A credit of 1.823c. per lb. for precious-metal contents and miscellaneous earnings makes a net cost of 9.843c. per lb. of refined copper. The actual yield of the ore treated was 50.01 lb. against 45.58 and 44.12 lb. of copper per ton for the two preceding years.

At the Copper Queen, by substituting smaller stulls and closer filling for the old square timbers, the consumption was reduced from 26.9 ft. to 23.3 ft. per ton of ore extracted. The distribution of timber used was: For stoping, 16.6 ft. per ton ore extracted; exploration and development, 3.9 ft. per ton; underground repairs, 2.7 ft. per ton and surface repairs and construction, 0.1 foot.

Acme Graphite Mines and Mills

By H. M. Beattie*

The graphite mines at Byers, Penn., were worked intermittently for about 40 years by opencut and crude underground methods; in 1910 systematic mining methods were adopted. The graphite occurs with quartzite in pre-Cambrian gneisses. Different concentration systems are used for treating hard and soft ores; the concentrates are reconcentrated in a finishing mill.

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The mines of the Acme Graphite Co. of New York are the most westerly of a series of graphite deposits, more or less continuous, extending from below Pikeland to a little beyond Byers, Chester County, Penn. This company's property consists of two mines formerly known as the Pennsylvania, and the Continental. Of these the former is the older, having been in operation with some intermissions for 40 years. There is a record of a quantity of flake of excellent grade being sold, in 1876, to one of the Jersey City crucible companies.

At this time the mine was operated as an opencut, but a little later underground operations were started in a crude way. The property was "gouged," only the rich pockets, some of them containing as high as 30% carbon, were touched, and as mining methods were but little understood by the managements, the stopes were insufficiently supported and soon caved, when operations would be transferred to some other rich outcropping. Mills were built at various sites depending on the situation of the mining operations. More recently a slope was sunk in the hanging wall of the deposit to a vertical depth of 70 ft., and operations were carried on from levels run from this slope. A vertical shaft was also sunk to a depth of 154 ft. but this shaft is used only as a sump.

After changing hands a number of times the Pennsylvania and also the Continental, which is situated about ¼ mile to the west of the former, were purchased in 1910 by a New York corporation, and attempts were made to operate on an economical and more efficient basis. At the time this company took over the properties, there was on the Pennsylvania a mill in bad state of repair, designed specifically for the treatment of soft ore, which makes up a large proportion of the output of this mine. At the Continental was a mill designed for the treatment of hard-rock ore, and a finishing mill in good condition. These mills will be taken up in detail later.

Graphite Occurs With Quartzite

All of the graphite deposits of this valley occur in a well defined ridge with a strike closely approaching east and west, and extending with some breaks from below Pikeland to beyond Byers. The deposits are in pre-Cambrian sedimentary gneisses, the graphite occurring in conjunction with quartzite, with which the carbonaceous material, which afterward became graphite, was probably contemporaneously deposited. The crystallization is undoubtedly due to movement, of which there is good evidence in the exposures in the opencut. The crystallization was intensified by the intrusions of pegmatite, as is well shown in specimens of the ore taken from various parts of the mines.

Opencut of the Pennsylvania Graphite Mine, Byers, Penn.

In the Continental mine the graphite-bearing quartzite is not thick, and so far as present development work shows seems to be confined to one particular lens not over 150 ft. in length, and averaging about 5 ft. in thickness. The Continental, as developed, has all the features of the feathering out, or end of some large deposit. The extensive development work that was needful in this mine, with the probable small amount of ore that would be opened up led to the abandonment of the mine after the development work had been carried to a point which showed up the feathering-out feature above alluded to.

In the Pennsylvania mine the graphite appears in a number of quartzite strata, three principal ones of which are worked at the present time, and there are good indications that still another stratum underlies those already opened up. All indications go to show that the graphite will extend to a reasonable depth without alteration, except that the ground will probably become harder as we leave the area affected by decomposition which has taken place near the surface, resulting in a clay and sandy loam gangue, and that the gangue will be a quartzite or micaceous schist, the nature of the gangue varying in different parts of the orebody. The body has been opened up to such an extent that there is reasonable ground for stating that the deposit is continuous for a distance of at least 1500 ft. and that over this length would average at least 10 ft. in thickness, this taking into account the barren areas, and the fact that over some distance the thickness is fully 30 feet.

As the Continental has been abandoned I will take up only the methods employed at the Pennsylvania. Under the old regime the work was carried on by opencut, and later from slopes put down in the ore, the slope being widened and gouged out and the roof supported by timbers.

Since in many places the deposit is from 15 to 30 ft. thick, and could be opened only for a thickness of 12 ft. at the most by the use of stulls, a great deal of valuable ore was left in place, and as these workings afterward caved it became almost impossible to recover the ore so left. Very often these small stopes were carried to within a few feet of the surface, and later operations show that they could have been

much more economically and satisfactorily worked by opencutting.

At present the mine is operated from the opencut in connection with haulage on the main level. Development work is also carried on, underground, most of the bodies being so opened up as to furnish immediately accessible reserves, in the case of bad weather making the opencut unavailable. The present management found the opencut worked to such a depth that it had become impossible to handle the waste. Additional raises were therefore put through from the main level, so that at present both waste and ore are hoisted to the surface. Underground stoping is done by the filling system, raises being run through to the surface, and the waste from the opencut used as filling, thus doing away with the use of timbers except for temporary supports for the roof which, when the ground is damp has a decided tendency to slough off, but when dry will stand as long as necessary for the stoping operations.

As the method for treating the hard ore differs from the treatment that the soft ore has to undergo, different methods of concentration are used, and these will be taken up separately.

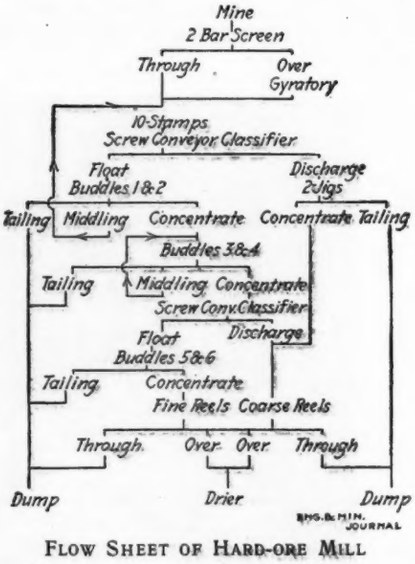
Concentration of The Hard Ores

The ore as it comes from the mine is dumped into an ore bin, over a 1½-in. grizzly, the fine material going directly to the stamps, while the coarse material goes to a Gates gyratory crusher. This breaker does not give satisfaction as a breaker for graphite ore, as the graphite tends to lubricate the bell and liner necessitating a great deal of sledging to force the rock through. It has been thought that the use of corrugated plates for liners might obviate this difficulty. The fine crushing is done in a 10-stamp battery, the stamps weighing 850 lb. Screens of 8-mesh iron-wire cloth are used, it having been found by numerous tests that crushing to this size frees all the graphite from its containing gangue, and at the same time the mesh is sufficiently coarse to prevent undue breaking up of the flakes. The capacity of the stamps crushing to this mesh is 120 tons per 24 hours.

From the stamps the ore goes to a screw conveyor set at an angle of 20° to the horizontal, which screw acts as a classifier, the float or overflow going to 20-ft. buddles, the coarse material going to a jig of the type used in some of the garnet mines of New York State. A jig of the New Century coal-jig type, would in the opinion of the superintendent, give much more satisfactory results but up to the present the change has not been made.

The tailing from this jig is sent to the sand dump by gravity, the concentrate, being the coarser flake, is sent either direct to the reels or if not clean enough to the buddles. The buddles effect a good concentration when the ore has largely quartzite gangue, but when the ore comes from near the surface, and contains a large percentage of loam or clay, the concentrate carries a considerable percentage of this clay, which balls up in rolling over the surface of the buddle, and is difficult to remove at any later stage.

There are in the mill six buddles altogether; the first two, 20 ft. in diameter, are filled and cleaned alternately, the later buddles treating middling from the first buddles. A large amount of middling gradually accumulates from this method, especially after the fourth buddle, and at present this middling is dumped back into the bin and re-treated by going through the entire circuit. It was thought that a table of the Wilfley type might be used to good advantage on this middling but the table purchased,



Flow Sheet of Hard-ore Mill

the Traylor, on account of its flexible table top, set up currents on its surface which hindered the concentration, and gave too large a middling product. A Wilfley, Deister, or James table would work to much better advantage.

From the buddles the concentrate goes to hexagonal reels, which remove a greater portion of the mud, that has collected with the concentrate at the edge of the buddle. This part of the process can best be studied by a perusal of the flow sheet. The overflow of the first four buddles goes to a settling tank of the Callow type, the overflow going to a centrifugal pump, which pumps the water back through the system, while the sludge is washed on reels, giving a clean but fine concentrate. The concentrate is shoveled into a steam dryer from which it goes to the stock bin of the finishing mill. It might be said in this connection that the direct dryer gives much better satisfaction than the steam dryer, for there is, with the concentrate, a certain amount of wood fiber or small chips, which have to be gotten out before finishing, and when the wet concentrate is dried in a rotary kiln this wood is all burned out.

Concentration of the Soft Ores

The ore at the Pennsylvania occurs in a softer gangue, a great deal of the graphite breaking free from its gangue by simply rubbing in the hand. The harder rock coarser than 1½ in. is broken in a Blake jaw crusher, but the soft ore is dumped on a platform and shoveled into a Sturtevant rotary crusher. This crusher gives excellent service so long as the nuts have good cutting edges, but when made from cast iron these parts used to give their best service for only about two weeks. The company then changed over to manganese parts which gave more than five times the service for twice the original cost.

The ore then goes to a hexagonal shaft agitator revolving at 14 r.p.m. During this agitation the ore is further broken, most of the graphite that is contained in a clayey gangue being freed. From this point the ore passes through the system as shown in the accompanying flow sheet, the idea being always to float the graphite out as early in the process as possible, and it has been found that this is better done the closer the material is sized.

The log washer does not furnish an ideal method of concentration, as the grinding action causes excessive sliming so that, even though the sand discharged from the washers assays only in the neighborhood of 1.5% carbon, yet the actual final extraction is only in the neighborhood of 40%. Up to a short time ago no saving of graphite finer than 60-mesh was attempted as no means had been devised for separating the more finely divided graphite from the mud and fine sand. After some experimenting it was found that a reasonably good separation took place if this fine tailing from the 60-mesh was dewatered by running through a 100-mesh silk reel, and the overs from this reel discharged on a cement table, having a pitch sufficient to carry off the graphite but not sufficient to float the fine sand.

This method has worked satisfactorily and gives a considerable amount of additional concentrate of high percentage carbon, which when it has passed through the finishing mill yields a grade of dust worth from two to three cents per pound. It has been thought that this fine material might be concentrated on a Frue vanner with good success, but up to the present no experiments have been made to verify this supposition. A buddle cannot be used as the currents set up by the action of the brushes are sufficient to so disturb the mixture of fine sand and graphite that no separation takes place.

The use of the cement table after the reels and then the use of a final reel to take out what fine silt has run through the system so far, has brought the carbon extraction up from 35 to 43%, and at the same time gives a concentrate assaying 60% to 70% carbon as against previous assays of from 35% to 50%. This bettering of the concentrate has served to raise the average value of the total output from 3.6c. to 4.2c. per lb., based on the same prices for the various grades. But the accompanying table showing the large percentage of loss that takes place in the slime will show that the room for improvement is still great.

TREATMENT DATA AT THE PENNSYLVANIA MILL

	Tons per Day	Assay	Tons Carbon per Day
Ore	35.2	6.35	2.235
Sand tailings	14.5	1.02	0.148
Concentrates	1.72	58.82	1.006
Slimes (by difference)	19.02	5.68	1.081
Carbon extraction	45%		

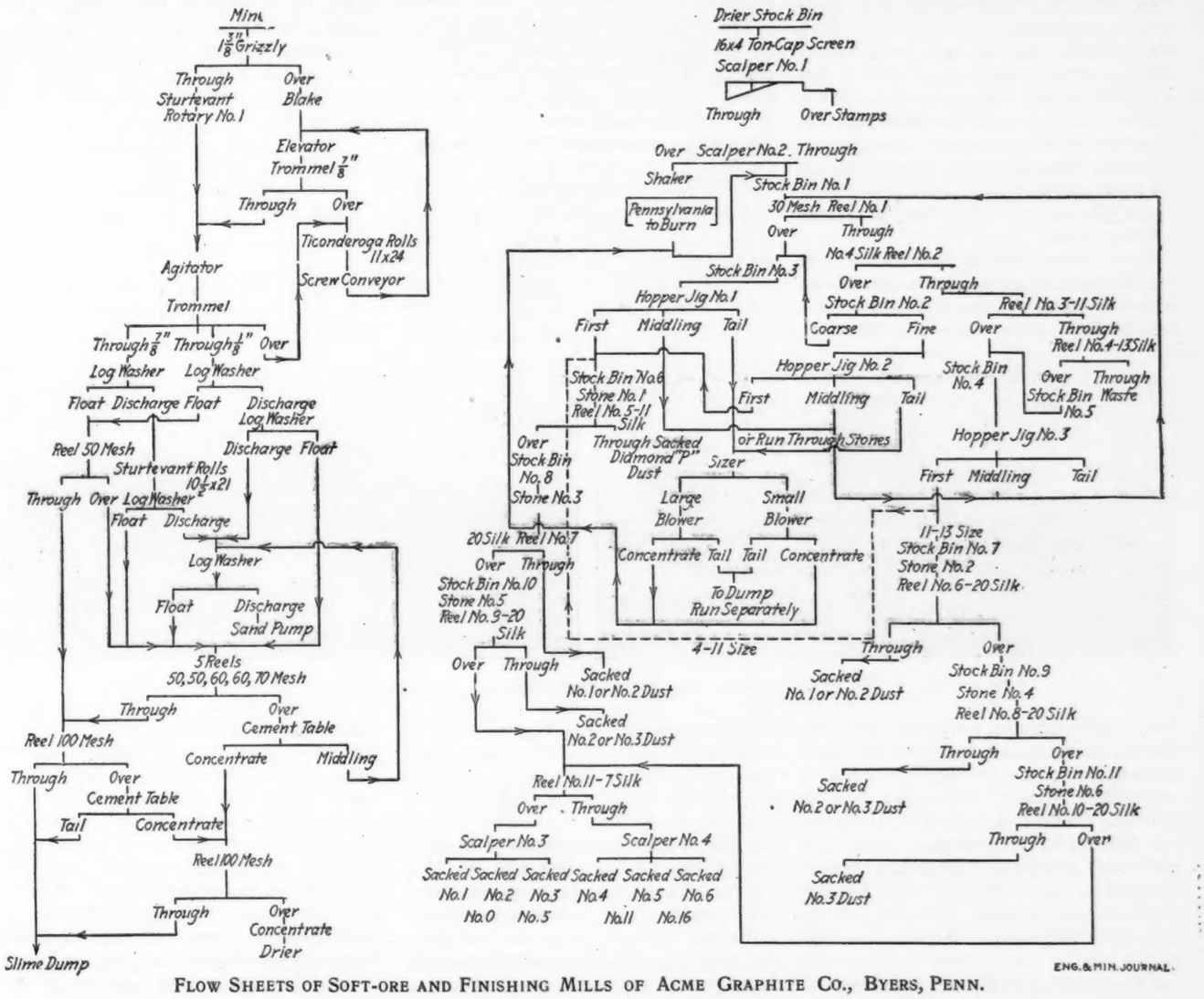
The concentrate in this mill is dried in a rotary kiln, at a red heat, this heat being employed for the purpose of burning out any wood that may be carried in the concentrate, and also in the endeavor to so change the physical character of the mica that may be contained, as to make it more easily ground out in the finishing mill.

Concentrates Treated in Finishing Mill

The first requisite for the production of a high-grade finished product, is to have a high-grade concentrate to work on, and a difference of 10% in the carbon content of the concentrate will give finished products running from 10 to 15% higher in carbon, and commanding correspondingly better prices for each grade. The dried concentrate as it comes to the mill is first run through a sizing reel covered with 16x4-mesh wire cloth, all the overs from this reel being returned to the concentrating mill.

From this point the graphite passes through other sorters and sizers, and then the various sizes are treated on the Hooper air jigs, of which there are three in the mill, and others will be installed later. The Hooper jig does efficient work when operating on a closely sized material, and it is for this reason that another machine should be installed so that the material passing the 40-mesh could be more closely sized, and better results obtained. The other machinery in this part of the mill does not need description.

Each grade of concentrate passes over three stones, and after each stone the dust is taken out, different grades being produced as shown on the flow sheet. The dust from the first cut, called "P" dust, since the changes in the concentrating end of the mill have been made, has decreased to an almost negligible quantity, forming less than 4% of the whole as against 20% of the whole output when a 35% concentrate was being sent to the mill. The stones used in the grinding and polishing are French Buhrs over-runners dressed as in flour mills. Over-runners are used entirely in this mill. The stones have to be dressed not oftener than once in six



Flow Sheets of Soft-ore and Finishing Mills of Acme Graphite Co., Byers, Penn.

weeks, and the last stones only about once in three or four months. Given a good concentrate, the wear on face of the stone is slight, but with a large amount of grit in the concentrate, the wear is rapid and serious.

One of the most serious difficulties which the graphite operators in the Chester Valley have encountered is the elimination of the mica which occurs in association with the graphite, and on account of its physical character, being thinly laminated like the graphite, if it once gets to the finishing mill, it is almost impossible to get rid of it. One way of doing this is to raise the temperature to such a point in the drying that a certain change takes place in the mica, puffing it up and making it brittle so that it grinds out in the stones. This change, however, does not take place with all the kinds of mica, being more pronounced in the case of the darker than the lighter colored micas.

Some experimenting was done with the Wetherill magnetic separator, and the tests as run at the Massachusetts Institute of Technology were so satisfactory that a machine was purchased, but the present operators of the mine and mill are unable to obtain any commercially satisfactory results. The idea was to treat the finished product, but this is on the face of it unreasonable, since the total iron content of the better grades of flake is not over 1%, and usually only one-half of that, and this iron is chemically combined in the mica so as to be, so far as the present management has been able to determine, nonmagnetic. Careful sorting of the ore in the mine, and thorough burning in the dryer, seem to be the best methods that have so far been devised for the elimination of this troublesome adulterant.

Total Cost About $4 Per Ton

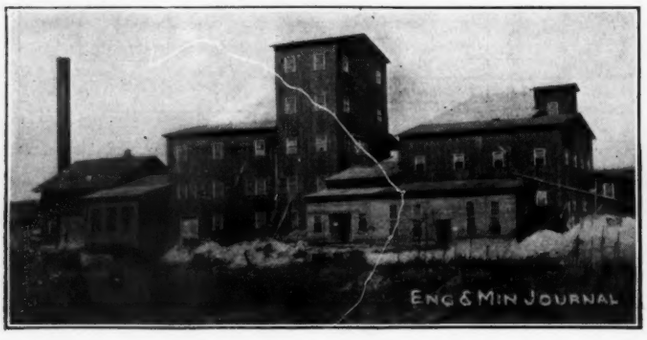
Although careful cost sheets have been kept since the present owners have been operating, so much of the work has been of an experimental nature, and so many repairs have been necessitated on account of the bad condition of the machinery, that it is impossible to give an accurate statement of the costs. Having taken all things into consideration, the management would feel safe in estimating an average cost of $4 per ton to include all charges including depreciation and interest on investment, this charge based on an output of 150 tons per day and continuous operation. On the same basis the cost per ton of finished product would be $70, although this cost might be better in case a high-grade ore was treated. All these costs are based on a 6% ore. Of course on a larger tonnage they could be considerably reduced.

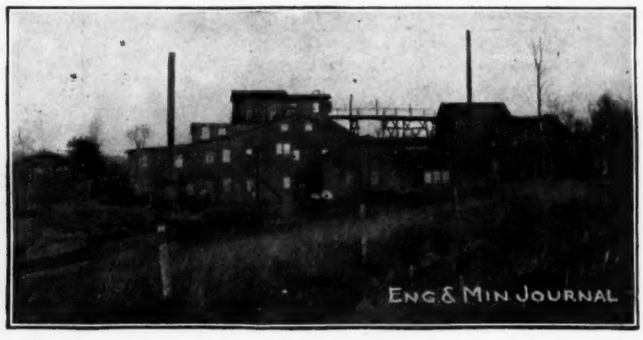
The producer of American flake graphite confronts certain market conditions, difficult to overcome, the principal one being a prejudice among the members of the crucible manufacturers against the flake graphite, this prejudice arising from the fact that they have so many times in the past bought from samples submitted and then the shipment has not come up to the standard of the sample. Or else the manufacturer has bought one or two carloads and when he goes to purchase a third finds that the operator has gone out of business. They are sure of their Ceylon graphite, and for that reason if for no other prefer to use it. Some claim that the Ceylon graphite makes a better crucible, but others claim that a mixture gives the best results. Either a cause or effect of the state of the market is the difficulty of competing with the Ceylon graphite in price, quality being equal. The graphite can be produced so cheaply in Ceylon that even with the freight to this country, it can be landed in New York at about the same price that American flake can be produced.

When methods have been devised for obtaining a higher extraction at less cost, and when the American users of graphite can be convinced that the American flake is better for their use than the Ceylon, then will the graphite companies be able to declare dividends, and get beyond the hand-to-mouth stage, in which condition they have been up to the present time.

The hope of the American flake-graphite producer lies in the increasing of the carbon extraction, and in production on such a scale that the finished product can be produced at a cost which will enable the producer to place his flake grades in the hands of the crucible manufacturers at such a price as to induce them to use it in quantity in competition with the Ceylon grades.

The finer flake grades find an outlet in the lubricating trade, but I do not see a very bright future for this business as the prejudice is well founded among engineers against using as a lubricant a material which soils and blackens everything with which it comes in contact, especially as the question is disputed as to whether the graphite adds sufficiently to the lubricating properties of suitable oils to warrant the trouble and expense of mixing. The stove-polish trade consumes a large proportion of the dust grades, the remainder finding an outlet in the foundry facing trade and as a base for graphite paints.





Acme and Pennsylvania Mills of Acme Graphite Company, Byers, Penn.

Ontario 1911 Mineral Production

The following final figures for the mineral production of Ontario for 1911 are furnished by Thomas W. Gibson, Deputy Minister of Mines: Silver, 31,507,880 oz.; pig iron, 526,610 tons; nickel, 17,441 tons; copper, 8966 tons; iron ore, 175,631 tons; cobalt, 853 tons; gold, 2185 oz.; total value of metallic products, $29,102,867. Of interest among the nonmetallic products is portland cement, 3,010,849 bbl.; salt, 88,689 tons; petroleum, 10,102,081 imperial gal.; corundum, 1471 tons; pyrites, 43,629 tons, and arsenic, 3806 tons. Of the Ontario iron ore, as noted above, 67,631 tons were smelted in the province's own furnaces.

Missouri Lead Ore in 1911

There were 3,974,712 tons of crude disseminated lead ores produced in southeast Missouri in 1911, carrying an average content of 3.7% lead, says the U. S. Geological Survey. The concentrates produced from this carried 67.3% lead. The total output of the state in galena concentrates amounted to 258,006 tons and 234 tons of carbonates. These concentrates contained a total of 16,098,120 lb. of lead.

Copper Mining at Lake Superior—I

By Claude T. Rice

The bedded lodes in the Michigan copper country occur either as amygdaloid flows or as conglomerates. Only one conglomerate, the Calumet & Hecla, is now being worked. The mining methods used depend upon the dip of the lodes. The dip varies from 30° at the north end of the range to 70° at the south. The mines where the dip is less than 40° are considered here.

The ore in the Lake Superior copper district occurs in two ways. The first ore discovered was that in the fissure veins of Keweenaw County, followed later by the finding of the vein deposits of Ontonagon County, farther south. The fissure veins, although productive in the early days, are no longer worked as practically all the profitable ore has been extracted from them. This copper occurred in masses and its mining was a different problem from that of working the bedded lodes.

Amygdaloids and Conglomerates

The bedded deposits, in turn, are of two kinds; some of the ore is a mineralization of amygdaloidal flows of basalt, while in other bedded deposits the copper occurs in conglomerates. Where the fissures that cut across the Keweenawan series, as the copper formation is called, are productive, none of the amygdaloids and conglomerates as yet have been shown to be mineralized sufficiently to be profitable. On the other hand also, in the part of the district where the bedded deposits are profitable, the only cross fissures that carry copper are the three small veins of mohawkite that cut across the Kearsarge lode in the Mohawk mine and the two in the Ahmeek.

The Keweenawan series of rocks in which the copper ores are found consists mainly of basaltic lava flows, many of which, when extruded, were laden with large amounts of gas and so were filled with numberless vesicles when the flows consolidated. Intercalated among the flows are sedimentary deposits, mainly conglomerates and sandstones, 30 or more in number. Two of these conglomerate beds, the Allouez, sometimes called the Boston & Albany, and the Calumet & Hecla, have been found to contain copper in varying quantities. The ore along the Allouez conglomerate is bunchy and of late years its mining has not proved possible, while the Calumet & Hecla conglomerate has shown itself by far the most productive and the richest formation in the Lake Superior copper district, although its paying portion is restricted to the two-mile stretch that outcrops in Calumet & Hecla ground and underlies the Tamarack. Five of the amygdaloid flows are sufficiently rich in copper to make their mining profitable, while several of the others are almost rich enough to pay for working them, under the present economical Lake methods.

With the exception of a small amount of copper that has been obtained from the copper-arsenide seams that cut across the Kearsarge amygdaloid, all the copper from the Lake Superior mines has come from ores carrying the copper only in metallic form. The manner in which this native copper was deposited in the lodes is still a doubtful point, but as this series of articles will deal strictly with the mining of the ore, it is not necessary to go into that discussion. Only sufficient geology will be given here to make clear the effect that the manner of occurrence has on the method of working the deposits.

The native copper was deposited in the vesicles of the flows and also in vugs and open spaces; some of the latter are jointings due to the contraction of the basalt as it cooled and others were formed by subsequent fracturing of the rock due to dynamic stressing. In general, the grade of the ore varies inversely with the compactness of the rock and in the northern part of the district fine copper is rarely found in any but the more porous and somewhat altered parts of the flows. Many of the vesicles have been filled with calcite and laumonite, and the mineralized portions of the flows often have been much epidotized. The wide span of green epidote near the red copper on the Wilfley tables in the amygdaloid stamp mills is noticeable. In some cases the copper forms pseudomorphs after calcite and in others the copper is found replacing earlier epidote. Some native silver occurs in the ore, more in the old vein mines than in the amygdaloid lodes, and this silver has been precipitated without alloying to any great extent with the copper. One of the oddities of the ore is the "half-breed" nuggets, in which native copper occurs side by side with native silver. The masses of copper masses in the sense that the term is used in the amygdaloid mines, but not such as characterize the fissure veins, were formed in the cracks and vugs and many of them have peculiar shapes.

Copper Makes Drilling Difficult

It is these masses of copper that make the drilling in some parts of the lode difficult, as often a hole will strike one and an hour will be lost before the drill batters its way through the copper or the machine men decide to abandon the hole. Some of these masses form irregular bunches, having an area of 4 or 5 sq.ft., and a few are found 7 or 8 ft. long and 2 ft. wide by a few inches thick; in robbing one of the shaft pillars at Hecla No. 7 shaft, on the conglomerate lode, a continuous mass of copper 150 ft. long and from ½ to 6 in. thick was found extending from foot to hanging, the cutting of which with dynamite was difficult work. The amygdules are generally confined to the top of the flows, in which part also is found most of the fine copper. However, some vesicles formed during solidification near the bottom of some flows and that portion was much cracked and broken during solidification. Consequently copper is often found making off into the foot wall and sometimes even extending into the top of the flow below.

The copper along the foot wall is much less regular than along the hanging and is of lower grade. Indeed only in recent years has its mining been profitable. As the amygdaloid lodes are mineralized flows, the copper occurs irregularly and cuts off suddenly, while the hanging is rough and comes in and swells out, as the top of such extrusions would be expected to do.

Ore Widens and Contracts

The more compact portion of the flow approaches and recedes from the hanging wall, causing the band of good ore to widen and contract in a perplexing manner. These compact portions of the lodes are called trap. A slight lateral movement has occurred along the lodes, rarely being over a few feet, and the mining of the ore progresses as though no displacement had taken place. There are signs of slickensides along some of these slips, but the movement was of an up-and-down jiggle rather than a heave; only at the Mohawk No. 5 workings, toward the south end of the mine, is there any noteworthy movement of the lode in the northern part of the district. There one fault has thrown the Kearsarge lode 40 ft. to one side, while in a short distance a compensating fault has thrown the lode back into alignment again.

The machine men, if attentive, can easily tell when they get out of the lode into the wall rock, by the change in the color of the sludge. Also by watching the sludge where it runs down over the rough face, it is possible to tell something of the grade from the amount of copper that concentrates out in this crude manner. However, following the ore in the amygdaloid mines is not easy even for one accustomed to any particular

lode, and the mine maps show many places where considerable work was necessary to find the lode again after the miners had lost it.

Determining the Value of the Ore

The amygdaloid ore cannot be sampled accurately and all mining must be guided by the eye. Familiarity with the ore in a particular mine makes the captain expert in guessing the grade of the ore from the general appearance of the face, but it is still all guesswork, and only from the recoveries at the mill and the grade of the tailings can the true grade of the ore be obtained or even approximated. In judging the grade much dependence is placed upon the amount of coarse copper, as the fine copper generally bears a relation to the amount of the coarse found in the "rock," as the ore is called in the district. With a little exposure the copper tarnishes and is hard to see. When that has happened one can judge roughly of the grade by running the hand over the face of the stope.

Some of the copper in the amygdaloid ores will pass a 200-mesh screen and a good portion of the copper lost in the tailings is still locked up in the rock, although in many of the amygdaloid mills much of the ore is ground fine before it is given the final concentration. The grade of the ore varies suddenly in short distances and if an accurate sample could be broken from a face, it would show only the grade of the ore exposed in the stope at that particular time. It would indicate little about the real grade of the ore in the block, even if the sample weighed several tons, for at the Osceola mine of the Calumet & Hecla company, and the same is true to a large extent at the other amygdaloid mines, if the mill runs are considered in lots of 85,000 tons, the recovery per ton of ore will vary as much as 15% at times for the different lots, although the grade of the tailings remains practically constant at about 3½ lb. of copper per ton.

Ore Hard to Sort

Because of the difficulty in obtaining the grade of the ore, the latter is hard to sort and at most of the mines the only place where it can be done with economy is in the stopes. Even with the greatest care in sorting amygdaloid ore at the ore houses, it is almost impossible for the sorter to keep the grade of the discarded rock so low but that it will carry enough copper to be profitable, if milled and smelted. For that reason little sorting is done on surface. In the northern part of the district only the compact gray ore of the Mohawk mine seems to be adapted to sorting at surface; in this ore most of the copper occurs coarse with comparatively little fine accompanying it.

The Calumet & Hecla conglomerate is composed of well rounded pebbles and boulders, some of them as large as a man's head. The pebbles are derived mostly from porphyritic felsites and quartz-porphyries. The cementing material is composed of siliceous and felspathic grains, but in the paying portions this cement is almost completely replaced by copper. Many of the pebbles themselves have been wholly or partially replaced with copper, so that the conglomerate ores must be ground much finer than the amygdaloids, and even in the undersize from a 200-mesh screen, many of the copper particles are still contained in the grains of rock.

Conglomerate Red in Color

The conglomerate is stained red with iron oxide, the richer part being somewhat lighter in color than the lower-grade portion, on account of the alteration that resulted from the precipitation of the copper. The upper half of the conglomerate lode is finer grained and generally richer than the lower half, and occasionally bands of sandstone are found in the lode, some of which are mineralized although they are generally lower in grade than the surrounding portions of the conglomerate. The conglomerate is frozen tightly to the flows above and below, so that in stoping the ore does not always break readily from the wall rock, but brings down portions of the roof with it. However, mining in the conglomerate lode is greatly aided by the fact that the grade of the ore is fairly uniform throughout a stope and all of the rock that is broken is profitable. Also, owing to the greater regularity of the distribution of the copper in the conglomerate, it is possible to estimate the grade of the ore by sampling. The grade of the ore in both the amygdaloids and the conglomerates decreases appreciably with depth, but this decrease in the grade is more rapid in the conglomerate than in the amygdaloids.

Most of this decrease no doubt is real, but in the case of the amygdaloids some is merely apparent, as much of the ore mined now was entirely too low grade a few years ago to pay for removing it from the stopes. For instance, about eight years ago the Osceola Consolidated could obtain just a moderate profit on amygdaloid ore yielding 26 lb. of copper per ton, while at present ore yielding only 15 lb. per ton is mined by the Calumet & Hecla company from the same lode at a fair profit. Indeed, the Osceola company had to leave in the foot wall of its workings rock that would be almost bonanza ore in the amygdaloid stopes of today.

The Dip of the Lode and Its Effect on Mining

The copper-bearing formation has a general northeast-southwest strike and a northwest dip. The latter increases from the Ojibway on the north to the Baltic on the south end of the range. The dip at the Ojibway is a little over 30°; in the north end of the Mohawk about 37° at surface, decreasing to 34° as depth is attained; at the North Kearsarge 38°; at the Wolverine 40°; 37½° on both the amygdaloid and conglomerate lodes of the Calumet & Hecla, while at the old Atlantic and the Quincy, the dip is 54°, although decreasing to 37° at depth in the latter mine. At the Isle Royale and the Superior mines, it is 60° and at the Baltic, Trimountain and Champion mines, 70°, the steepest in the district.

The dip of the lode determines the mining method used and as the mines in the northern part have a low dip, the practice there is different from that in the southern portion. Since the lodes dip at angles greater than 42° in the latter section, it is possible to use either ore- or waste-filled stopes in getting the ore. In describing the mining methods, therefore, the practice of the two groups of mines must be considered separately. In these articles, the mines where the lodes have dips of less than 40° are considered.

Mines under Consideration

The producing mines in this part of the district are the Mohawk, Ahmeek, Allouez, Osceola Consolidated, Wolverine, Calumet & Hecla, and the Tamarack, in which are worked the Kearsarge and the Osceola amygdaloids, and the Calumet & Hecla conglomerate. The Tamarack and the Calumet & Hecla companies alone are working on the conglomerate, while at present only the Calumet & Hecla company mines on the Osceola amygdaloid. The other mines are all on the Kearsarge lode, which is the most persistent of any in the district, as it is productive for nearly eight miles and has produced more than any of the other amygdaloids.

The method of mining the ore in the conglomerate and amygdaloid lodes differs radically, although there is so much in common in the general practice that I will describe them together. In the conglomerate, owing to the great weight of the hanging wall, the stopes must be timbered closely, for the richness of the ore would forbid the leaving of pillars even if the ore were strong enough. As it is, however, the ore shears badly under weight and scales off so that if a pillar were left in a stope it would be of little effectiveness. Due to the strength of the hanging wall and the lower grade of the amygdaloid ore, which stands well in pillars, it is possible to do the mining without any timber in the amygdaloid mines. This difference in the strength of the hanging wall in the two deposits makes itself felt even in the smaller development workings, as while drift stopes 9x19 ft. in size are good practice in the

amygdaloids, the drifts in the conglomerate mines cannot with economy be made larger than 6x11 ft. and most of them are not more than 8x8 feet.

Hanging Wall of Conglomerate Lode Is Heavy

The hanging wall of the Osceola lode is considerably weaker than that of the Kearsarge, but it is not so poor as the hanging of the conglomerate workings. The great weight in the conglomerate mines is due partly to the nature of the flows both above and below the conglomerate and partly because of the great weight on all rocks at depths approaching a mile vertically beneath the surface; lateral drifts paralleling the conglomerate, even when placed 200 ft. away in the foot wall, give much trouble owing to the swelling of the foot and the scaling away of the sides and roof. It is a peculiar fact that the amygdaloid flows near the conglomerate are stronger than the more compact flows, and the drifts give less trouble than when in the less vesicular lavas.

Profitable Grade of Ore

In the low-dip mines, an amygdaloid ore yielding 13 lb. of copper per ton, with copper at 12c. per lb., is about the limit of profitable ore; the limit of profit in the conglomerate mines at the present depths of from 6000 to 8000 ft. on the dip of the lode, is about 20 lb. of copper per ton, although in the Red Jacket workings of the Calumet & Hecla, ore yielding 15 to 16 lb. per ton can now be mined at a profit. But these are nowhere near the limits of what can probably be done in the amygdaloid lodes, as James MacNaughton, general manager of the Calumet & Hecla company, predicts in the near future a total cost of $1 per ton for producing the copper from the amygdaloid ore, while no doubt considerable economies are yet to be made in the mining of the conglomerate ore. The latter, however, will not be as great as in the amygdaloids, as the weight of the hanging wall will prevent the concentration of the hauling and other advances that seem to be approaching in the mining of the amygdaloid ore, where a greater latitude is allowed owing to the great strength of the hanging wall.

One-man drills will soon be in general use in the stopes, in spite of the great width of the lodes that makes their handling much more difficult than in the stopes of Western mines. Greater concentration of mining operations, with attendant decrease of tramming and hoisting costs; provision for storing more waste in the stopes instead of hoisting it; reduction in the cost of operation through greater centralization; increase in saving at the mills and reduction in the cost of transportation, are at hand to help out in the reducing of the mining expenses and in bringing down the grade of the ore that is the limit of profit. Owing to such economies the limits of profitable ore will be greatly increased in the next few years and there can be no question but that the limits in depth that J. R. Finlay has given for these mines, although probably warranted at present, especially when valuing mines for taxation purposes, will be greatly exceeded. The abandoned merger would doubtless have greatly hastened the attainment of these economies.

Hoisting Practice

Each district in the United States has its peculiarities in its mining practice, but probably the Lake Superior copper district is one of the most unique in this respect. The mines are the deepest in the world and they are handling the lowest grade of copper ore in the United States, not excepting even the so called porphyry mines. From some of the shafts 2000 tons of ore are hoisted in the two shifts per day that are worked. It is surprising, therefore, to learn that some of the deepest mines on the Calumet & Hecla conglomerate are served by shafts having only one hoisting compartment. One of the South Hecla shafts serving conglomerate workings 6500 ft. deep with timber, and through which 1000 tons of ore per day are hoisted, has only one hoisting compartment; also Calumet No. 4, which serves the Red Jacket workings that extend to a depth of about 8000 ft. on the incline, with timber and other mining supplies, has only one hoisting compartment.

One reason is that there is not so much advantage in balanced hoisting in inclined shafts as there is in vertical shafts, and what is more important at the conglomerate mines, balanced hoisting is not as flexible as unbalanced hoisting. Further, the engines are designed to compensate in efficiency of operation, for any loss that may result from not hoisting in balance; all the conglomerate hoists which are operating out of balance, are driven by Leavitt tandem-compound condensing engines connected to the drums by gears. The drums have a diameter of 25 ft., and are driven by 7-ft. pinions having hickory teeth, so that the engines run almost noiselessly. The drum is thrown into gear with a clutch and lowering is done with the brake.

Hoisting Drums Covered with Lagging

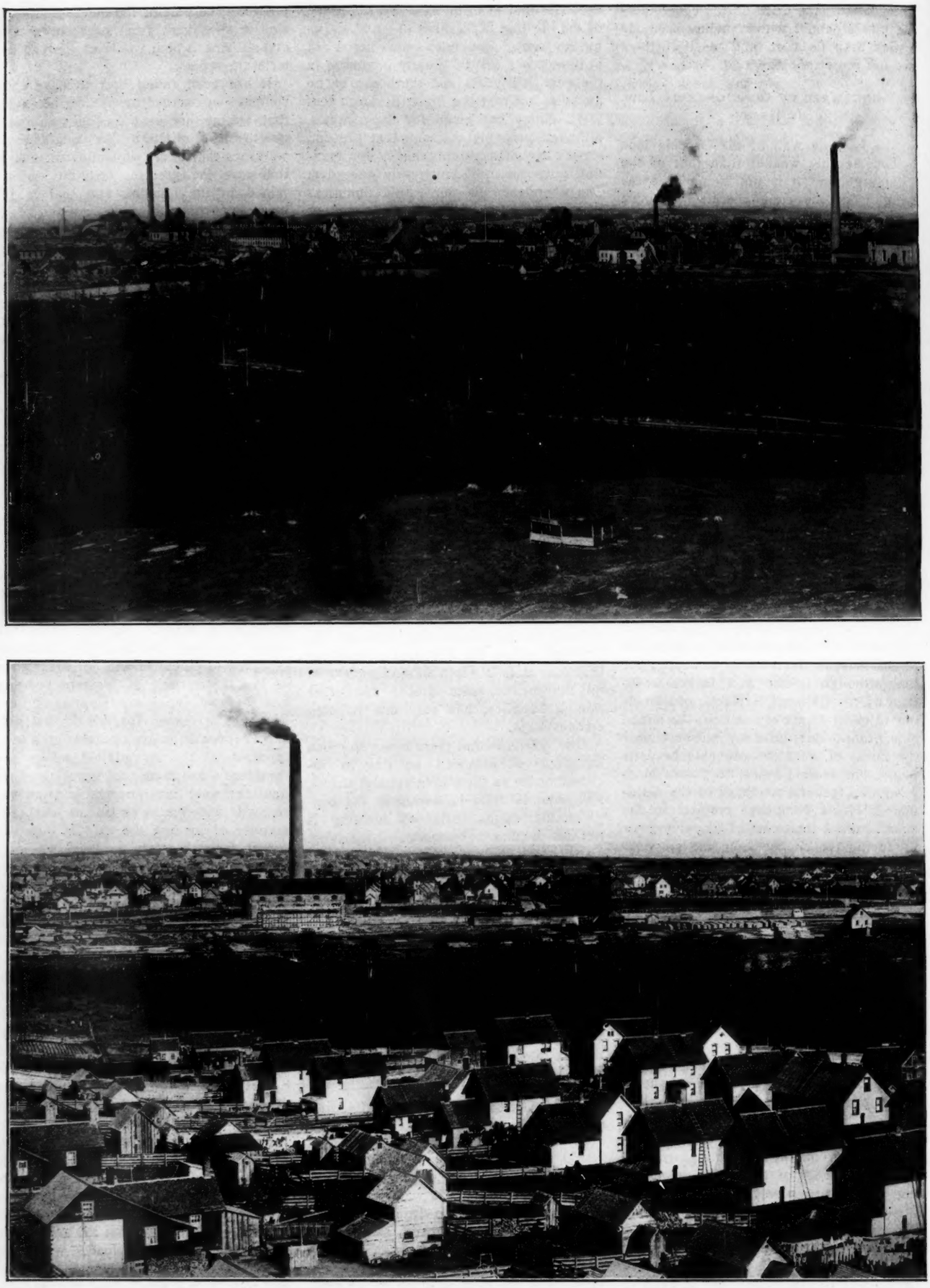
In order to dissipate the heat that would be generated, the drum is covered with easily replaceable maple lagging, while the brake band is water-cooled. In this way heating of the drum is avoided, together with the expansion strains that would result. In order to keep the part of the brake strap that takes the strain, away from the heat as much as possible, shoes are riveted to the brake band proper. The part of the band under tension is thus kept from overheating and crystallizing, which would cause it to deteriorate rapidly.

It has been found best to have each compartment served by its own hoist and that engine operated by its own engineer, even in shafts on the conglomerate workings that have two compartments. In this way the greatest flexibility is obtained in the hoisting and that is the most important thing in gaining low-hoisting cost at the conglomerate mines, where a large part of the hoisting capacity is expended in lowering timber and other supplies to the stopes, and not more than 65% of the time can be devoted to hoisting ore. This is not merely supposition, for hoisting in balance was tried at one of the conglomerate shafts and it was found that one side of the shaft was practically useless when timbers were being lowered on the other side; that little more rock could be hoisted in the shaft through the two compartments when operated in balance, than with one side.

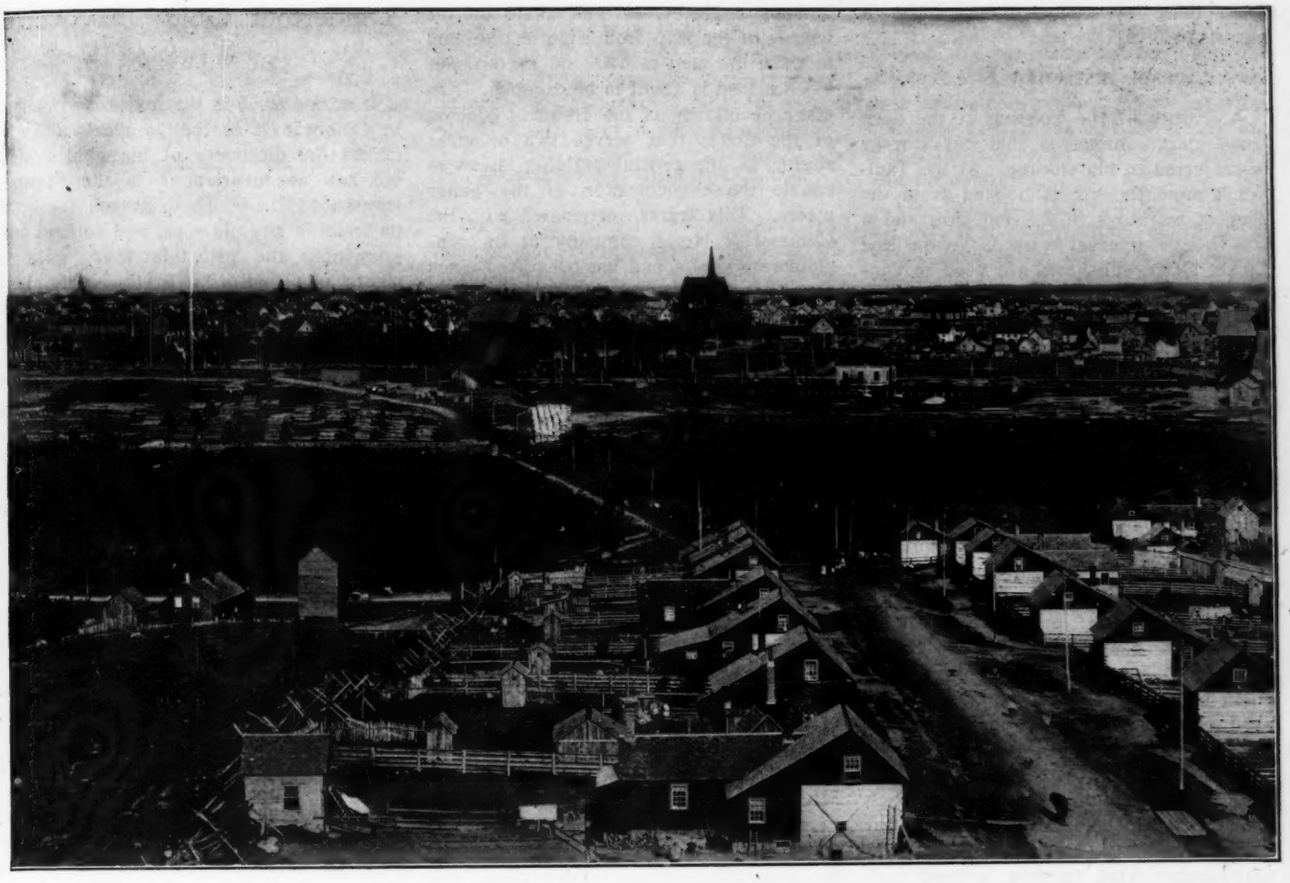
Unbalanced Hoisting at Conglomerate Mines

Unbalanced hoisting is characteristic of practice only at the conglomerate shafts; balanced hoisting is used at the amygdaloid mines. However, this balanced hoisting is not done with the drums designed to clutch in and out of balance, as is characteristic of Western hoisting, but the two ropes are wound on one drum. The reason for this is that only two or three drills are operated on a level in most of the amygdaloid mines and therefore there is no concentration of the hauling; only two successive trips can be made with the skips from a level. The manner of loading the skip is also different from Western practice, as loading pockets are not used and the cars are dumped directly into the skip. This is due to the width of the veins, about 12 ft., the tonnage from which is not thought to justify the cost of cutting pockets, at least not on each level.

Another reason is that most of the shafts are sunk in the lode and it is not good practice to cut large stations at the levels so that cars can be stored until several skip loads have accumulated. Therefore there would be no gain in operating efficiency through the use of a two-drum hoist and if two drums were used, the truss form of drum design would have to be abandoned. The only drawback in the balanced system used is the overrunning of the level each trip; when both ropes are wound on the same drum one skip must go to the bottom of the shaft every time that the other goes to the surface with its load. While this increases the wear and tear on the track and rope, it is a small disadvantage. Indeed, the capacity which can be obtained



PANORAMA OF CALUMET & HECLA COMPANY'S OPERATIONS ALONG THE CALUMET &



HECLA CONGLOMERATE LODE, IN MICHIGAN. LEFT TO RIGHT IS NORTH TO SOUTH

from these two-compartment shafts is surprising.

Car Storage Instead of Bin Storage

A feature of the hoisting at the deep conglomerate mines is that car storage is preferred to bin storage. At the Tamarack mine the ore is hoisted from the deepest workings in 2½-ton cars and a 200-ft. level interval is used. At the Red Jacket shaft, subshafts are used to concentrate the haulage on the tramming levels, which are driven 300 ft. apart on the dip of the lode, and on these tramming levels rope haulage is used to take the ore to the vertical shaft. At the latter, the ore is stored in the cars and dumped into the measuring pocket as fast as the latter is empty. This measuring pocket holds 7½ tons or one skip load. Only one compartment at each level is served by the pocket and time is thus obtained between trips for dumping the three cars that it takes to make a skip load. As it is of primary importance that nothing goes wrong with the dumping mechanism, an air piston with a chain having a hook on the end of it, is used to dump the cars into the pocket, for a tipple arrangement would be more likely to get out of order.

This system requires a man at each hoisting level, who does nothing but dump the cars. However, as it permits concentrated hoisting without cutting large openings around the shafts, it is more conservative practice than would be the cutting of ore bins and loading pockets. In case that hoisting from a level, once each round trip, does not provide time enough for the filling of the pockets, the hoisting interval can be increased by drawing from another level before returning; since there is a dumper or skip-loader at each level, there is no disadvantage from jumping the level. This system of hoisting has proved so economical that if electric haulage were used at the amygdaloid mines and the tramming and hoisting concentrated upon every fourth or fifth level, some operators think that it would be better to keep a man at each level to load the skip and dump the cars than to use storage bins and make the large openings about the shafts that these bins entail. Such large openings in time result in great trouble. This method of handling and storing ore at shafts generally would not occur to the Western manager.

Hoisting Centralized

Most Western mining men consider it essential that the hoisting engineer shall have a clear view of the collar of the shaft. The drums at the large shafts in the copper country, owing to their size, have to be placed at about 300 ft. from the collar of the shaft with the ore house in between. Consequently a man is kept at the collar of the shaft to signal to the hoisting engineer, as well as to oil the wheels of the skip from time to time and to warn the men at work on the crusher when a load is about to be dumped. Another peculiarity is the frequent placing of the hoists that serves two or more shafts, in one central building so as to enable the concentration of the boiler plants. This feature originated with the Calumet & Hecla company at its conglomerate shafts, and has been used since at the South Kearsarge, at the older shafts of the Ahmeek and Mohawk companies, and at the Baltic mine, on the south range. When the Calumet & Hecla company was formed, it found itself with a number of shafts close together, partly as a result of mining necessity and partly owing to the consolidation of the two neighboring properties, working the same lode. The heaviness of the ground and the limited capacity of a shaft, due to the large amount of timber and supplies that had to be lowered into the conglomerate workings per ton of ore mined, made the company reluctant to close down any of these shafts, especially after it found by experience that it was likely to lose some of them by fire.

It is well known, of course, that a hoist is not an economical user of steam. While running, it demands a large amount of steam for the work being done, and, when idle, the condensation loss is great. By generating in one boiler plant, the steam for several hoists, it is possible to operate the latter with less boiler horsepower than if each hoist had its own boilers. Instead of piping the steam, the Calumet & Hecla company decided to lengthen the rope and to place the hoist in a central building near the boilers. Then, in case it was decided to close down a shaft, the engine could be used without moving and resetting. Further, it was thought as economical to wear out hoisting rope as to pay for a large condensation loss between boilers and hoist.

This principle has been carried so far that in one of the engine houses there are four hoists serving as many different shafts, one of which is 2600 ft. away. The engines are set at right angles to the lode, and each rope is carried from a sheave wheel back to the orehouse to its engine, over a line of idlers having wood-filled rims, that are carried by low towers about 50 ft. apart. These idlers are loose on their axles, so that they work into line as the rope winds from one side of the drum to the other. This construction also minimizes the number of babbitted bearings that have to be maintained. This centralization of the hoists is made feasible by the flat topography, but owing to the increasing distance between shafts, now characteristic of amygdaloid practice, it is no longer followed and each of the newer shafts has its own steam plant.

(To be continued)

Tenderfoot Gold Discoveries

By W. Weston

It seems as if in the majority of cases in Colorado it is the "tenderfoot" who makes the discovery of big gold mines. He has no theories as to the "proper formations" in which to search for gold, he looks in any old rock, and follows unknowingly the principle that "gold is where you find it." In the early days of Cripple Creek a man came down from the mines to Colorado Springs, and a friend meeting him on the street said: "Well, how are things up at the Creek?" "Oh!" said the miner, "the miners are looking for the gold where it ought to be, and the tenderfeet are finding it where it is."

In Ouray two tenderfeet went to the top of a sheer cliff of sandstone, just north of town, and tying a rope to a quaking-asp sapling, one lowered the other about 30 ft. down the face so that he could crawl into a hole which they had seen from the valley below. The floor of the cave was covered with about a foot of red dirt, which assayed 10 oz. gold per ton, and this was the discovery of the American Nettie, since credited with an output of over two millions.

Stratton was not exactly a tenderfoot, but he was a carpenter and not in any sense a miner, and prospected in the summer, and took for assay some common red granite that he found sticking up like a vein. And when his first carload of Independence granite rolled into the yards of the Boston & Colorado Smelting Co., the manager laughed exceedingly, but it sampled 3 oz. gold to the ton, and has produced over ten millions.

The Camp Bird was staked by a greenhorn just out from the Royal School of Mines, of London, the first vein he had ever seen except in books, and it has produced over twenty-two millions.

Another great gold mine in the State, which shall be nameless so as not to hurt anyone's feelings and which has paid many millions in dividends, was discovered by a plumber, and some time later when he had become a millionaire and had learned to wear a clawhammer coat and boiled shirt, and mix with the "quality," he was dining out, and the host said to a friend next him, "See that man down the table? Well, not over three years ago he was doing a job of plumbing in my cellar, and he got into the wine bin and drank up a lot of my finest brand of champagne."

But it is not always thus with the tenderfoot, for it is recorded of the Osceola at Ophir that one of them refused to stake the outcrop, which showed quantities of free gold, on the grounds that it was "native brass" and therefore worthless. However, enough won-

ders have been worked in the way of discoveries by tenderfeet to show that no formation must be classed at sight as nongold-bearing, not even the grindstone or the jug handle.

Present Smelting Rates in Utah

SPECIAL CORRESPONDENCE

There are four smelteries being operated in and near Salt Lake Valley. The U. S. Smelting, Refining & Mining Co. at Midvale and the American Smelting & Refining Co., at Murray are smelting lead ores, as are also the two lead furnaces of the International at Tooele. The last company has four reverberatories smelting copper ores. At Garfield the copper smeltery of the American Smelting & Refining Co. (Garfield Smelting Co.) is treating concentrates from the Utah Copper Co's mills and custom copper ores; it is operating five reverberatories and two blast furnaces. More sulphides are being received than formerly, and some of the plants are increasing their roasting capacity. Two Dwight & Lloyd sintering furnaces have recently been added to the plant at Murray. There is a good market for ore of all classes.

SMELTING CHARGES AND PENALTIES

The smelting charges are dependent upon the character of the ore, tonnage, etc. Where the ores come from, Tintic, Bingham, or Park City, is of small consequence, though some of the Park City producers pay a flat smelting-rate. In general, on silver-lead ores (sulphides) lead is settled on a basis of 90% of assay at New York quotations, less 1¼c. per pound for transportation and refining; if the ore contains less than 5% no payment for lead is made.

Copper in silver-lead ores is paid for on the wet assay less 1%, less from 3 to 4½c. per unit on New York quotations as per ENGINEERING AND MINING JOURNAL. If copper is present in small amount, i.e., less than 2%, it is sometimes added to the lead assay, and paid for as lead. Silver is paid for at 95% of the assay at New York quotations on date of assay. Less than one ounce is not paid for. Gold is paid for at $19 or $19.50 per ounce, if over 0.02 oz. In some cases, 95% of the gold is paid for at $20 if over 0.025 oz., which amounts to about the same. Ores containing several ounces of gold being a higher price. Iron is paid for at from 5 to 10c. per unit, while silica is debited at from 7 to 12c. per unit. Zinc is allowed free up to 10%, but is penalized at 30c. per unit above this. In some cases zinc up to 17% is allowed. Arsenic and antimony in speiss is penalized when in excess of 5% at 20 to 25c. per unit. Sulphur up to 2% is not penalized, but above this is charged for at 25c. per unit, with a maximum sulphur charge of $2 or $2.50 per ton. In some cases these charges are covered by a higher treatment base, which ranges from $1.90 to $4 per ton.

OXIDIZED LEAD ORES IN DEMAND

On carbonate lead ores containing 40% lead or more there is frequently no smelting charge, but 1¼c. per pound is deducted from the quotation for lead. For oxidized lead ores containing much iron, for example some ores from the Santaquin district in Utah County, a nominal smelting rate of less than $1 per ton is paid. At times, there is either no charge for smelting or the shipper receives credit for the iron. Oxidized lead ores are always in demand.

Park City silver-lead ores contain much zinc, especially the ores mined from fissure veins. The zinc is separated as middling, which is treated locally by the Grasselli Chemical Co., of Utah, or a zinc concentrate is made which is shipped to eastern plants. Zinc ore is received by the U. S. Smelting Co. at Midvale, and is treated at its Huff electrostatic plant. The ore is either bought outright or treated on a custom basis approximately as follows: A treatment charge of $3 is made, a roasting charge of $1.50 per ton, and 10% of the silica is charged for at 12c. per unit. Gold is paid for at $18 per ounce; 80% of the silver is paid for at the market price; 80% of the lead is paid for, less 1½c. per pound; 60% of the iron at 6c. per unit, and 30% of the zinc at 2c. per pound.

On copper ores of the usual grade, about 3% sulphides with an excess of iron, the charges are: Copper, 1% off, less 2¾c. off market quotations; iron ranging from 15 to 20% is paid for at 5c. per unit, while silica is debited at 10c.; silver and gold are paid for as mentioned for lead ores, and there is a flat treatment rate, usually from $2 to $3 per ton. Sulphur is not debited in this class of ore, as it furnishes part of the fuel.

Some Park City ores are treated on a flat-rate basis; others pay a base rate of $1.25 and more, with a premium on lead of 10c. per unit for lead in excess of 25%. Silica is debited at 10c. per unit, while iron is paid for at the same price. Copper in small amount is added to the lead assay, and paid for as lead. When in larger quantity it is settled for, as previously mentioned. Silver and lead are paid for at the usual rates.

TRANSPORTATION RATES CALCULATED ON GROSS VALUE OF ORE

Transportation charges are based on valuation, being 40c. per ton from Bingham to Murray, Midvale, Garfield, or Tooele on ores worth less than $15 per ton. Above this, the rate is 75c. per ton. The freight is figured on the gross value, before any charges are deducted, and not on the net value of the ore. The rates are subject to correction according to valuation furnished by the smelting company at destination. Park City ores pay a flat rate of $2 per ton on crude ore and concentrates.

The following transportation charges on ore from the various mines to the valley smelteries will give an idea of the rates on low-grade, medium, and high-grade ore: Ores from Tintic, (Mammoth, Eureka, and Silver City) to Tooele (International, Utah) via the San Pedro & Tooele Valley R.R. range from $1.10 per ton on $5 ore to $1.25 on $10 valuation; $2.50 per ton for ore between $25 and $50; $100 ore is charged $3 per ton, and $300 ore $7.50. Iron ores of no value for the lead, copper, silver, or gold contained, are charged 85c. per ton.

From Beaver County, Milford or Frisco, to the valley smelteries the freight ranges from $1.25 per ton on $5 ore to $10.50 per ton on ore valued at $300, the rate on $20 ore being $2.40. From Newhouse the freight charges are from 25 to 50c. per ton higher. Iron ores not exceeding $5 in value can be shipped for $1.25 per ton from Milford. From Modena in Iron County the rates are $1.75 per ton on $5 ore to $4.50 on $50 ore. From Ophir (St. John station), Stockton and Del Monte, in Tooele, County, from $1.10 on $5 ore to $3 on ore valued at $100. From Santaquin in Utah County, the rates are approximately the same. From American Fork, $1 per ton for ore not exceeding $100 in value.

RATES APPLY TO MINIMUM SHIPMENTS OF 20 TONS

The minimum weight for shipments at the above rates is 20 tons. Ore in carload lots is allowed to stop in transit at Salt Lake City, Midvale, Murray, International, or Silver City, Utah, for sampling without charge, except when sampled at International, a charge of $10 per car is made by the Tooele Valley Ry. for the haul from Tooele to International and return. If consignee desires to resample at another sampler, a charge of 10c. per ton is added to the through rate.

Sampling costs 50c. per ton at the Utah Ore Sampling Co.'s plants at Murray or Silver City, or at the McIntyre sampler at Park City, both independent plants. The smelters have their own samplers and make no charge for sampling. When sampling is done by the latter, it is usual for the shipper to employ a watcher to be present when the sampling is done, and look after his interests, principally in the matter of moisture samples. On smelting contracts for a term of years (from one to five years) more favorable rates for the shipper than those herein mentioned may be obtained.

Mining Casualties in Newfoundland

By Frederick L. Hoffman*

Newfoundland has had a rate of 2.6 deaths per 1000 for a five-year period. A careful examination of the accidents seems to show that the government regulations are good, and that lack of individual care is the chief factor in determining the mortality.

*Statistician, Prudential Insurance Co., Newark, N. J.

The mining industry in Newfoundland is relatively of limited extent, employing only about 2000 persons, chiefly in the mining of iron ore. Copper pyrites are mined to a limited extent at Tilt Cove, primarily for the sulphur contents, and there is a small amount of copper mining at other points, particularly at York Harbor. The Newfoundland government does not publish an annual report on the statistics of the mining industry, but an abstract is furnished to the Chief Inspector of Mines for the United Kingdom, and is included in the colonial and foreign statistics issued by that office. According to the last published report, there were 1913 persons employed in Newfoundland mines and quarries in 1908 and of this number 1489 were employed in iron-ore mining, 325 in copper mining, 49 in slate quarries and 50 in other quarries and workings. The total value of the mineral production in 1909 was £271,000, which for the Colony is quite suggestive of the relative industrial importance of iron mining as a source of remunerative employment.

Requirements under the Mines Regulation Acts

During 1908 there were nine fatal accidents in the iron mines, which, on the basis of the available information as to the number of employees, would be equivalent to a rate of eight per 1000. This experience was, however, rather exceptional, and during 1909 there was only one fatal accident in iron-ore mining, but the number of employees for this year was not returned. It is somewhat doubtful whether these returns are entirely trustworthy, in the absence of an official statement by the Newfoundland government. With regard to the iron-ore output, it requires to be taken into consideration that practically the entire production comes from Bell Island, Conception Bay, amounting in 1909 to 1,004,050 tons. The operation of mines in Newfoundland is governed by the Mines Regulation Acts of 1906 and 1908, which include a provision for statistical returns as to the specific occupation, name, age and nationality of the injured employee, as well as the length of service and required duty, understanding of the English language, the extent of the injury, and questions as to negligence or fault, and other facts of importance.

The reference to the notice of accidents to the Government Engineer in the mines regulation act reads in part as follows:

> Where in or about any mine, whether above or below ground, either—
>
> (a) Loss of life or any personal injury to any person employed in or about the mines occurs by reason of any explosion of gas, powder, dynamite, or other explosive, or of any steam boiler; or
>
> (b) Loss of life or any serious personal injury to any person employed in or about the mine occurs by reason of any accident whatever, . . . the owner, agent or manager of the mine shall, within 24 hours next after the explosion or accident, send notice in writing of the explosion or accident, and of the loss of life or personal injury occasioned thereby, to the government engineer, and shall specify in such notice the character of the explosion or accident, and the number of persons killed and injured, respectively, and as soon after as possible and before the end of each year a return of facts relating to such accident or explosion in the form given in the schedule to this act.

Powers of the Government Engineer

The reference to the powers and duties of the Government Engineer with respect to the mining industry reads that:

> The government engineer shall have power to do all or any of the following things, namely:
>
> (a) To make such examination and inquiry as is necessary to ascertain whether the provisions of this act relating to matters above ground or below ground are complied with in the case of any mine;
>
> (b) To enter, inspect and examine any mine, and every part thereof, at all reasonable times by day and night, but so as not to impede or obstruct the working of the mine;
>
> (c) To examine into and make inquiry respecting the state and condition of any mine, or any part thereof, and the ventilation of the mine, and the sufficiency of any special rules for the time being in force in the mine, and all matters and things connected with or relating to the safety of the persons employed in or about the mine or any mine contiguous thereto;
>
> (d) To exercise such other powers as are necessary for carrying this act into effect.

The Government Engineer is required to report the results of his investigation to the Minister of Agriculture and Mines, so that there is not only adequate government protection, but also provision for the proper reporting of his findings to the Government.

Through the courtesy of the Government Engineer, T. A. Hall, I have been provided with a return of the fatal accidents in the mines of Newfoundland during the period commencing Nov. 15, 1901 and ended Nov. 21, 1911. The return includes 26 fatal accidents described briefly and with a due regard to the conditions under which the same occurred. As a contribution towards the study of the accident problem in metal mines, the details are of considerable interest and well deserving of serious consideration on the part of those immediately responsible for the safety of men in mine operations.

Fatal Accidents at Bell Island

Nov. 13, 1906, crusherman, age 20, "caught between picking-belt pulley and frame on his way to pull switch of picking belt. He went down on the wrong side."

June 1, 1907, driller's helper, age 23, "the driller whom he was helping drilled into a partially fired hole containing dynamite and caused explosion."

July 27, 1907, trammer, age 17, "while he and his mate were pushing an empty car to the bin to be loaded, the engine driver, on a signal from another workman who says he signaled to slack up, started the car in the opposite direction, and the man was knocked down, the car going over his body."

Aug. 26, 1907, shoveler, age 26, "while using a pick to loosen ore recently shot which was being loaded into cars he struck a piece of dynamite lying in the ore and caused an explosion."

Sept. 3, 1907, driller, age 24, "hanging wall fell in on him while setting up his machine for work. He had been warned repeatedly that roof was settling down, but disregarded the warning which three other workmen with him acted upon and escaped."

Sept. 26, 1907, trammer, age 19, "riding on car to his work contrary to regulations. Loaded car broke away and crashed into car he was on."

Nov. 25, 1907, face cleaner, age 52, "buried under fall of ore while engaged taking same down to make room safe for ordinary miners."

Jan. 24, 1908, shoveler, age 18, "riding up slope on loaded car contrary to rules, and after being specially warned not to do so. Had coat over his head, and was struck on head by overhead roller and killed."

Feb. 22, 1908, driller, age 30, and assistant driller, age 18, "were drilling a second lift of a slope bottom when they drilled into hole of first lift containing unfired 'rippite' which caused explosion, killing one and fatally injuring the other."

Feb. 21, 1908, flogger, age 22, "knee crushed between two ore cars. Death caused by septic poisoning combined with low condition of health."

Feb. 25, 1908, foreman blacksmith, age 40, "while putting belt on pulley his coat sleeve got caught in set screw of pulley tearing his arm from the trunk. He died of shock. The shafting should have been stopped by him before he attempted to adjust the belt."

Feb. 29, 1908, muck foreman, age 46, shoveler, age 17, "a man who was using a pick to loosen the ore recently mined struck a piece of dynamite and caused an explosion. Two other workmen received bad injury and one was slightly injured on this occasion."

Feb. 28, 1908, gate tender, age 14, "empty runaway car jammed him between gate post and wall, crushing his body. He should not have been standing where he was but was inexperienced."

Mar. 5, 1908, track layer, age 28, "body was found by two shovelers buried under fall of ore from roof. The roof was known to be in doubtful condition, but foreman face cleaner failed to warn him and to see that he did not work there."

July 15, 1909, trammer, age 20, "crushed between two cars at pier through own want of care."

Mar. 4, 1910, shoveler, age 32, "another workman when shoveling ore, struck piece of dynamite which caused an explosion. The man died 10 days afterwards from injuries received."

Nov. 30, 1910, messenger, age 15, "struck by swinging cable, which broke from control pulleys, and was thrown a considerable distance causing fracture to skull. Died in hospital 10 days later."

June 15, 1911, skip man, age 63, "jammed between stationary and moving car on trestle. Reason for his being in position of danger not explainable."

June 16, 1911, trammer, age 22, "when riding up on full trip of cars he jumped off into the parallel track, and was run over by an empty trip going down the main slope. This occurred in daylight and can only be explained by deceased taking a perilous risk."

Oct. 10, 1911, drill helper, age 24, "while on his way to work was struck by runaway trip of full cars in main slope. Evidently thought he was in position of safety. Had ample warning and space in which to take refuge."

Nov. 21, 1911, shoveler, age 21, "came in contact with electric lighting current carrying 220 volts. Wire was insulated for 600 volts, but insulation although not broken had become defective. Tests taken immediately afterwards showed leakage of 125 volts. Believe this is a unique case of such low voltage shock resulting fatally. He was removed almost immediately from contact."

Fatal Accidents at Tilt Cove

July 16, 1907, miner, age 43, "struck in calf of leg by rope which was suddenly pulled taut knocking him down. He fell on back of his head on tram rail fracturing his skull."

Mar. 11, 1910, miner, age 47, "ore pile at which he was working, "ran" and he was caught and pinned down by some large pieces and badly crushed."

Oct. 14, 1911, miner, age 53, "A large piece of ore fell from north wall of mine, and alighting near him broke into several small pieces which rebounded striking him and causing internal injuries."

York Harbor Mining

July 4, 1910, miner, age 23, "was sent down skip with special instructions to pick up a wrench that fell down skip-way and lodged on cross-beam out of reach of ladder way. While being raised he evidently put his head out over edge of skip, and coming in contact with a beam got his neck broken. Daylight in shaft."

Nov. 2, 1910, miner, age 40, "crushed by 30-ton fall of ore and rock. After warning was given by foreman to escape another man further away from place of safety got clear of fall, and not explanable why deceased did not escape also."

Average Death Rate, 2.6 per 1000

Assuming that the average number of persons employed in the mining industry of Newfoundland was 2000 the average rate on the basis of 26 deaths for the five year period would be 2.6 per 1000 per annum. This cannot be considered an excessive fatality rate considering the dangerous character of the opencast mining at Tilt Cove and the peculiar mining conditions at Bell Island, including subaqueous works. In part the favorable results are to be attributed to the effective method of mining supervision involving at the same time a minimum degree of official interference in mine management. There are a number of excellent provisions of the mine regulations which are deserving of consideration, but the most important of these is the requirement that "special rules must be established in every mine appropriate to the particular state and circumstances of each mine to serve for the conduct and guidance of the persons acting in the management, and of those employed in or about the mine, with a view to prevent dangerous accidents, and to provide for the safety, convenience and discipline of those employed therein."

The special rules are required to be approved by the government. Those of the management at Bell Island are a model of brevity, and practically inclusive of all that appears to be essential for the safe and satisfactory administration of mines. The rules of special interest are those having reference to the drill foreman, the magazine storekeeper and the blaster, and any deviation from these rules or non-compliance therewith subjects the offender to instant dismissal. The duty of the general inspector provides that

> He shall attend daily to his duties in or about the mines, examining all ropes, pulleys, engines, drills, pipes and machinery under his care, and reporting in detail on the same to the engineer, and that he shall order any defective machinery likely to endanger life or property to be stopped until properly repaired.
>
> Any person employed at the mine who knows that any other person has neglected, or committed a breach of any provision of the acts or special rules, shall immediately report the fact to the manager or under-manager, and any person failing to observe this rule himself shall be held responsible as an accessory to the commission of the offence so known to him, and shall be liable to be convicted as a principal."

The foregoing brief account of certain aspects of the metal-mining industry of Newfoundland would be incomplete without a reference to the pending bill providing for the manufacture, storage, and importing and sale of explosives. This bill includes brief but effective regulations and heavy penalties for non-compliance. The making of regulations is left to the Governor in Council, but the administration of the act is with the Government Engineer.

Reference also requires to be made in this connection to an act passed under date of Feb. 18, 1908, with respect to compensation of workmen for injuries suffered in the course of their employment and an act passed under date of March 29, 1911, providing for the payment of old age pensions.

Ignorance the Chief Cause of Accidents

The Newfoundland experiment in the regulation of the mining industry and the amelioration of the social and economic condition of the people employed therein has apparently been successful, considering the rather exceptional conditions under which the industries are carried on. A study of the accidents in detail, however, would seem to warrant the conclusion that much remains to be done to provide for the required degree of personal security in mining operations, and the necessary education of mine employees in the proper discharge of their hazardous and frequently quite complex duties. The mining problem in Newfoundland is seriously complicated by the quality of the available labor supply. A large number of so called miners are former fishermen, with a limited amount of actual experience in blasting and other kinds of underground work. There is, however, the decided advantage that, on the whole, the class of labor employed is industrious, sober, and law-abiding, with the result that the accidents which have occurred are chiefly due to ignorance of mining methods, rather than to deliberate indifference to the risk incurred.

As far as it is possible to judge from a

rather limited amount of available information, the government supervision of the mining industry in Newfoundland is carried on in an effective manner with a minimum degree of governmental interference. The tendency is apparently towards an increase in the attention which is being given to the elimination of needless danger and the installation of safety devices wherever practicable. At least, with regard to the company operating the mines at Bell Island, it may be said that not much is left undone to meet the requirements.

Rand Ore Reserves

By A. Cooper Key*

The accompanying table shows the total ore reserves of practically all the Rand producing and developing mines at the end of 1910 and the end of 1911. In some instances the company's fiscal year is not coincident with the calendar period and in such case the latest figures are given. Some companies adjust the ore-reserve statements to the quarterly periods, but this procedure is by no means general and, in any event, the figures must be regarded as less reliable than those presented in the annual report.

Of the two great consolidations, the Crown Mines' increase more than offsets the decrease evidenced in the case of the East Rand Proprietary Mines. It will be recalled that the decline in the latter case was due to the exclusion of all ore of a value of under 4.3 dwt. as against 3.1 dwt. for 1910, the latter value now being deemed too low. In other cases, e.g., Modder B., modified views have been taken, which have resulted in smaller calculated aggregates. In certain instances depletion by milling operations has exceeded the rate of replacement by current development. The scarcity of native labor coupled with big mill demand, has had much to do with this condition of affairs.

The large decrease shown in the Main Reef reserve of the Robinson is due to the exclusion of certain blocks which have proved unpayable in stoping, loss due to caving and transfer from payable to unpayable consequent upon higher pay limit assumed. New Kleinfontein shows a bigger aggregate of much the same value as last year and the Village Deep a substantial advance in aggregate. Witwatersrand reveals a marked improvement in value. The Consolidated Langlaagte has added over 1,000,000 tons to the reserve of the southern section, the value of the 1,250,000 tons opened being a shade under 7 dwt., which is an excellent value especially as it is calculated over a considerable width. The new mill of this company is due to start in the course of the next few months.

Brakpan Mines and Benoni have been transferred from the developing to the producing category. The former is doing excellently, but the returns of the latter have been indifferent. Van Ryn Deep has over 600,000 tons developed of a value of well over 7 dwt. On the whole the ore-reserve position may be regarded as satisfactory. It must not be forgotten, however, that working costs are showing a tendency to rise. E. T. Way, consulting engineer to the Anglo-French Exploration Co., has recently said that the average is about 20s. per ton. Workmen's compensation and contributions to the miners' phthisis fund represent several pence per ton.

RAND ORE RESERVES

Crushing Mines	December, 1910 Tons	Dwt.	Inches	December, 1911 Tons	Dwt.	Inches
Aurora West	339,000	5.85	36	345,600	5.85	36
Bantjes Cons.	958,500	7.6	41	772,201	7.3	....
Bantjes Cons. pillars	87,000	7.6	41	123,886	7.6	....
Benoni Cons.	606,000	6.4	....	522,671	6.8	43
Brakpan Mines	1,720,000	6.56	52	1,925,346	6.73	58
Cinderella Cons.	422,000	6.8	....	740,157	6.73	....
City Deep	2,273,000	8.2	58	1,941,883	8.1	....
City Deep pillars	141,000	8.2	58	136,992	8.2	....
City & Suburban	829,000	7.2	....	789,000	7.6	51
Cons. Langlaagte	401,000	(a) 6.37	....	397,017	(a) 5.9	....
Cons. Langlaagte deep level	179,300	9.25	....	1,222,630	(a) 6.9	47
Cons. Main Reef	.....	....	....	.....	....	....
Crown Mines	6,283,000	7.6	....	10,124,072	7.25	....
Durban Rood Deep	867,550	6.7	....	965,650	6.6	....
Durban Rood Deep pillars, etc.	194,426	7.3	....	322,421	7.2	....
East Rand Prop.	10,250,000	6.6	....	6,761,605	6.9	55
Ferreira	600,000	8.1	77	324,603	8.13	81
Ferreira Deep	1,779,000	9.6	....	1,837,808	9.7	....
Geduld Prop.	445,000	9.09	37	607,300	8.18	44
Geduld Prop. (probable)	102,300	10.7	41	190,500	9.08	42
Geldenhuis Deep	2,521,500	6.1	46	2,262,840	6.2	....
Ginsberg	341,000	(a) 6.55	....	367,646	(a) 6.8	....
Glencairn	1,121,000	4.00	....	925,000	(a) 3.5	....
Jupiter	1,074,000	5.8	....	1,089,000	5.74	....
Knight Central	320,000	4.98	....			
Knight Central	700,000	6.00	62	644,300	6.00	60.6
Knights Deep	(b) 1,700,000	5.5	....	1,650,000	5.2	....
Lancaster West	431,000	6.76	39.4	472,700	6.65	....
Lancaster West pillars, etc.	43,500	9.33	45.7	.....	....	....
Langlaagte Est	1,267,769	....	....	1,281,307	....	....
Luipaardsvlei Est	398,000	....		432,000	5.2	....
				(partial) 142,000	5.3	....
Main Reef West	430,100	7.9	48	.....	....	....
May Cons.	300,500	....	....	212,707	....	....
Meyer & Charlton	249,000	8.6	....	347,000	9.09	....
Modderfontein B	2,788,000	7.0	48	2,355,700	7.5	51
New Goch	742,000	5.3	53	962,600	5.06	63
New Heriot	485,600	8.4	46	569,716	8.4	46
New Kleinfontein	1,057,400	7.47	39.6	1,146,531	7.49	44
New Modderfontein	2,581,000	7.0	....	3,341,830	7.6	56
New Primrose	491,000	(a) 7.8	....	423,311	(a) 6.7	....
New Rietfontein	.....	....	....	361,484	(a) 6.1	....
New Unified	285,000	(a) 6.8	....	288,343	(a) 6.73	....
Nourse Mines	(b) 2,142,000	6.5	....	(d) 2,050,000	6.6	....
Princess Est.	283,000	8.6	....	656,500	7.26	27.4
Princess Est. pillars	11,000	12.6	....			
Randfontein Cent.	5,828,000	7.4	....	6,637,271	6.63	....
Robinson	1,794,000	11.77		1,526,661	11.4	73
Robinson main reef	2,202,000	4.24	....	1,307,000	4.2	....
Robinson Deep	(c) 1,100,000	7.2		.....	....	....
Roodepoort United	617,700	5.47	38.5	.....	....	....
Roodepoort United partial	112,500	4.97	42	448,800	5.49	42
Rose Deep	3,553,500	6.1	55	3,670,160	6.0	57
Simmer & Jack	2,650,000	6.3	....	2,500,000	6.4	....
Simmer & Jack, East	925,750	5.4	....	934,000	5.4	....
Simmer Deep	1,255,000	5.0	....	1,312,000	4.9	....
Simmer Deep partial	114,000	5.17	....	.....	....	....
Van Ryn	1,591,000	6.4	....	1,655,910	6.4	....
Van Ryn partial	203,000	6.9	....	86,872	5.76	....
Village Main Reef	1,775,000	....	....	.....	....	....
West Rand Cons.	1,125,000	5.5	46	1,003,000	5.25	49
West Rand Cons.	216,000	5.5	46	418,000	5.25	49
Witwatersrand	1,233,000	(a) 5.8	....	1,225,084	(a) 6.65	....
Witwatersrand Deep	1,700,000	7.16	....	1,436,000	6.79	49
Wolhuter	760,000	6.4	....	808,800	6.45	52
Developing Companies						
Apex	75,000	....	....	258,060	6.5	54
Rand Collieries	.....	....	....	374,200	5.37	42
Van Ryn Deep	.....	....	....	603,716	7.17	....

(a) Recovery value; (b) July, 1910; (c) March, 1910; (d) July, 1911.

*Editor, South African Mining Review, Johannesburg, South Africa.

Michigan Copper Mining Co.

The report of the Michigan Copper Mining Co. for 1911 shows a deficit of $15,639, which added to the accrued deficit as of Dec. 31, 1910, gives a total deficit of $83,572. No work was done in 1911 except by tributors working on the Branch vein of this property. The superintendent advises the resumption of diamond-drill work, stating that had their 1910-1911 drill results been on any other lode than one the working of which several miles away had proved unprofitable, it would have created great excitement. An assessment will be necessary to follow up this drilling further.

It is announced in *Echo des Mines*, June 27, 1912, that the country between Fez and Tangier possesses deposits of pitchblende which will be exploited for radium as soon as the country is completely pacified.

New Publications

THE AMERICAN FERTILIZER HAND BOOK, 1912. 8x11, pp. 307, illus.; $1.50. Ware Bros. Co., Philadelphia, Penn.

MINERALOGICAL NOTES, SERIES 2. By Waldemar T. Schaller. Pp. 113, illus. Bull. 509, U. S. Geological Survey, Washington, D. C.

METHODS OF AIR ANALYSIS. By J. S. Haldane. 5¼x7¾, pp. 30, illus. Charles Griffin & Co., Ltd., London; J. B. Lippincott Co., Philadelphia.

COALFIELDS AND COLLIERIES OF AUSTRALIA. By F. Danvers Powers. 6¼x8¾, pp. 412, illus.; 25s. Critchley Parker, Melbourne, Australia.

THE MINERALS OF TONOPAH, NEVADA. By Arthur S. Eakle. 7x10½, pp. 20, illus., paper. Bulletin of the Dept. of Geology, University of California, Berkeley.

GEOLOGY AND MINERAL RESOURCES OF THE PEORIA QUADRANGLE, ILLINOIS. By J. A. Udden. Pp. 103, illus. Bull. 506, U. S. Geological Survey, Washington, D. C.

THE GABBROS AND ASSOCIATED ROCKS AT PRESTON, CONNECTICUT. By G. F. Loughlin. Pp. 158, illus. Bull. 492, U. S. Geological Survey, Washington, D. C.

ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA DURING THE CALENDAR YEAR 1910. By John McLeish. Pp. 328. Mines Branch, Canada Department of Mines, Ottawa.

THE TIN-MINING INDUSTRY AND THE DISTRIBUTION OF TIN ORES IN NEW SOUTH WALES. By J. E. Carne. Pp. 378, illus. Mineral Resources No. 14, New South Wales Dept. of Mines, Sydney.

SUR LA PRODUCTION, LA DISTRIBUTION ET L'EMPLOI DE L'ELECTRICITE PAR LES CHARBONNAGES. By Félix LePrince-Ringuet. 6½x10, pp. 136, illus., paper. Ch. Béranger, Paris, France.

GEMEINFASSLICHE DARSTELLUNG DES EISENHUETTENWESENS. Herausgegeben vom Verein deutscher Eisenhüttenleute in Düsseldorf. 6x9½, pp. 404, illus.; 5 marks. Verlag Stahleisen, m. b. H., Düsseldorf, Germany.

DIE METALL- UND EISENGIESSEREI MIT BESONDERER BERUECKSICHTIGUNG DER LEGIERUNGEN UND GATTIERUNGEN FUR DEN MASCHINENBAU. By Hugo Wachenfeld. 5¾x8½, pp. 104, illus., paper; 4.50 marks. Wilhelm Knapp, Halle a. S., Germany.

MINING CONDITIONS UNDER THE CITY OF SCRANTON, PENN. By William Griffith and Eli T. Conner, with a preface by Joseph A. Holmes, and a chapter by N. H. Darton. Pp. 89, illus.; accompanied by numerous maps. Bull. 25, U. S. Bureau of Mines, Washington.

THE SUBWAYS AND TUNNELS OF NEW YORK — METHODS AND COSTS; with an Appendix on Tunneling Machinery and Methods and Tables of Engineering Data. By Gilbert H. Gilbert, Lucius I. Wightman and W. L. Saunders. 6x9¼, pp. 372, illus.; $4. John Wiley & Sons, New York.

CONCRETE COSTS: Tables and Recommendations for Estimating the Time and Cost of Labor Operations in Concrete Construction and for Introducing Economical Methods of Management. By Frederick W. Taylor and Sanford E. Thompson. 5x8, pp. 709, illus., $5. John Wiley & Sons, New York.

INTRODUCTION TO THE STUDY OF MINERALS. By Austin Flint Rogers. 5x7½, pp. 522, illus., leather; $3.50. McGraw-Hill Book Co., New York.

Contents: The form of minerals; physical properties; optical properties; chemical properties; the determination of minerals; the description of important minerals; occurrence, association and origin; the uses of minerals.

LA CONSOMMATION DE COMBUSTIBLE DANS LA FUSION DES MINERAIS DE CUIVRE ET PLOMB. By Georges Ralli. Reprint from Revue Universelle des Mines, Tome XXXIV, p. 213. 6¼x9½, pp. 187, illus., paper. Charles Desoer, Liège, Belgium.

This is a scholarly treatise on the burning of coke in the blast furnace. Every point is touched upon, and nothing is taken for granted, from a reinvestigation of Peters' figures for jacket-water losses to a correction of Austin's method of determining the total heat of fusion. To anyone interested in the theoretical side of blast-furnace thermo-chemistry, the book will be of great interest.

TEXT BOOK OF CYANIDE PRACTICE. By H. W. MacFarren. 6½x9½, pp. 291, illus.; $3. McGraw-Hill Book Co., New York.

This book is a general treatise on the subject of cyanidation, covering both theoretical and practical phases. Each branch of cyaniding is taken up in sufficient detail to enable the prospective cyanider to obtain a good working knowledge of the process. The cyanide operator should find the book a valuable aid in the study of his everyday problems. The excellent comprehensive classified bibliography will be especially appreciated by those desiring to learn what has been written on cyanidation and allied subjects.

CHEMICAL ARITHMETIC AND CALCULATION OF FURNACE CHARGES. By Regis Chauvenet. 6½x9½, pp. 302; $4. J. B. Lippincott Co., Philadelphia.

This book covers completely every type of chemical calculation which the student or practical chemist will be called upon to make. The author himself states that the expert will regard the explanations as puerile, and that they are meant to be, and that his lecture-room work has shown detailed, laborious explanations have been found necessary by him. In this one must defer to the experience which Doctor Chauvenet has had in teaching. But it is certain that the practitioner with any mathematical instinct, and a knowledge of chemical equations, will find the book hard, not to say irritating reading, although we will concede that it probably has great merits for the ordinary run of students.

DER PRAKTISCHE HOCHOFENBETRIEB. By Theodor Bender. Pp. 121, paper; 5.40 marks. Wilhelm Knapp, Halle, a. S, Germany.

This is a concise, comprehensive reference book of blast-furnace practice, written by an experienced man for the benefit of beginners in the industry. It is not very general in its application, except by inference, but gives the results of the writer's own experience in a somewhat restricted field. Principles are not often dwelt upon, but, on the other hand, there are many data and figures not readily found elsewhere, such as lists of necessary materials, cost prices, etc. It would be more valuable for the purpose of telling the beginner what experiences and difficulties he might meet, than to give a student a general understanding of the principles of the art. The contents are as follows:— Construction of the furnace, 37 pages; cost prices and operating expenses, 8 pages; raw materials (ore, lime, coke), 8 pages; products (pig iron, slag, gas, flue dust), 6 pages; blowing-in, 12 pages; operation, control and precautions in ordinary practice, 30 pages; repairs, 6 pages; irregularities, 11 pages; banking the furnace, 3 pages; blowing out, 5 pages; index, 2 pages. It is a book recommended to beginners or students who expect to engage in blast-furnace operation.

DAS TIEFBOHRWESEN. Unter Mitwirkung von Arthur Gerke and Leo Herwegen, bearbeitet von Hans Bansen. 6¼x9¼, pp. 517; 688 illus.; 16 marks. Julius Springer, Berlin, Germany.

This is the most exhaustive treatise on the subject of boring that has come under our notice. It is not limited to boring in rock, but includes boring in earth, by various kinds of augers, sinking of driven wells, the jetting process, etc. As is natural, the tools described are found mainly in Europe; no such wide variety of odd-shaped bits and accessory apparatus was ever seen, or found necessary, on this side of the Atlantic. Each separate type, no doubt, was designed to serve a definite purpose, but the aim of the American drill runner is to use as few varieties of tools as he can get along with, and these are usually of simple and uniform design.

The book describes in general outline, and in detail, the following principal methods of boring: European and Canadian rod methods; American oil-well system (very briefly); other rope systems; driven wells; earth augers; diamond drill; calyx drill (very incompletely); reaming; casing; recovering lost tools; surveying bore holes. In the last named chapter in particular the European fondness for delicate and complicated mechanism reaches its full scope; the simple, but effective, hydrofluoric acid or gelatin tube is barely mentioned.

A number of sections, dealing with the speed and cost of drilling are highly praiseworthy. In a number of respects the book ought to be valuable to American manufacturers, if only for a broadening of ideas; many of the European types have certain merits that deserve careful study, if not actual imitation. Among these might be mentioned those variations applied to the cable tool or the rod method for the purpose of accelerating the down stroke of the bit, causing it to strike a sharper blow and cut faster. This is impossible with the American rope system. A hammer drill, actuated by water pressure, or by electricity, and suspended from the end of a rope in the hole, is another European device that might be studied.

PERSONALS

Mining and metallurgical engineers are invited to keep The Engineering and Mining Journal informed of their movements and appointments.

Edwin C. Holden, of Madison, Wis., was at Nelson, B. C., early in July.

T. Lane Carter, of Osgood, Carter & Co., Chicago, is in Montana on professional business.

Rensselaer Toll, of Denver, has taken the management of the Mineral Farm mine, at Ouray, Colorado.

Charles O. Whitten, of Boston, has been chosen a director of the Isle Royale Copper Co., in place of J. Nelson Perkins, resigned.

Albert E. Hall, of the Dome mine, South Porcupine, Ont., is in New York for a few weeks on a combined business and pleasure trip.

J. B. Cleveland, formerly manager of the West Dome mine, Porcupine, Ont., is now in charge of the work at the Hudson Bay Porcupine property.

Dr. E. M. Kindle, of Washington, D. C., has accepted the position of invertebrate paleontologist in connection with the Geological Survey of Canada.

Peter McLaren, engineer in charge of the Scottish-Ontario mine, Porcupine, Ont., has gone to London in connection with the affairs of the company.

Ellis P. Earle, president of the Nipissing Mines Co., has been elected a director and member of the Executive Committee of the Tri-Bullion Smelting & Developing Company.

Henry E. Monroe, a San Francisco attorney, has been appointed a member of the board of trustees of the California State Mining Bureau, to succeed Frank W. Griffin, whose term has expired.

Frederic R. Weekes, of New York, has been spending the summer at Voigt's camp, near Princeton, Similkameen, B. C., where the British Columbia Copper Co. is developing several mineral claims.

Roscoe Wheeler, superintendent of the Hedley Gold Mining Company's 40-stamp mill at Hedley, Similkameen, B. C., has been visiting other gold stamp-mills to familiarize himself with their practice and processes.

M. S. Davys, managing director of the Silverton Mines, Ltd., opening a silver mine in Slocan district of British Columbia, arrived in that province at the end of June to remain several months at his company's Hewitt-Lorna Doone group near Silverton.

E. A. Vageda, of Buda-Pest, Hungary, representing the Society of Engineers of Austria-Hungary, recently visited Ottawa in the course of an investigation into the peat resources and industry of Canada, and had a conference with Dr. Haanel, Canadian Director of Mines.

T. G. Janney, superintendent of the Shasta Dredging Co., operating a bucket-elevator dredge on Clear Creek in Shasta County, Calif., will leave for Japan on Aug. 3. He will be succeeded by Moreau Ashley, who has for several months been superintendent of the Alta Bert dredge in Trinity County.

W. H. Storms, state mineralogist of California, has accepted the invitation of mining men at High Grade, Modoc County, to visit that camp. He will go there in the latter part of July. As Mr. Storms recently criticized some of the methods of promoters in attracting miners and investors, his report of what he may learn from a personal visit will be looked for with considerable interest.

With a view of increasing the efficiency of the inspection of purchases made by their companies, and, at the same time, have the work performed more economically, the Harriman Lines have abolished their inspection and testing department and placed the work in charge of their engineering department, and directly under the supervision of Consulting Engineer John D. Isaacs. He has made an arrangement with Robert W. Hunt & Co., under which that firm on July 1 took into their employ 58 inspectors who had been connected with the railway organization, and assumed all the inspecting and testing work, including locomotives, cars, etc. Robert W. Hunt & Co. have been for many years inspecting the Harriman companies' bridges and rails.

OBITUARY

Joseph Robbins died at Robbins Station, Penn., July 12, aged 89 years. He was born in the house where he died. He was one of the pioneer coal operators in the Youghiogheny Valley and was associated in opening those fields with Andrew Carnegie, William Thaw and Thomas S. Clark. It was largely through his efforts that the Youghiogheny was made navigable by dams. He was also one of the promoters of the Pittsburgh & Connellsville R. R., now part of the Baltimore & Ohio.

George Manson Hill died at San Francisco July 10 of typhoid meningitis. He was 45 years old and was born in San Francisco. He graduated from the University of California as a mining engineer in 1889. He was superintendent of the Caribou mines in British Columbia, and had also engaged in mining in Placer County, California. In recent years he made his home in Alameda, engaging in real estate in San Francisco. In 1911 he was appointed a state harbor commissioner by Governor Johnson, and by reason of experience as an engineer, was selected by the board to take charge of the engineering department of the commission, and had planned great improvements in the shipping and harbor facilities at San Francisco.

Edward George Warren, general manager of the British Columbia Copper Co., whose death and services with that company were noted last week, was born at Hawkesbury, Ont., in 1874. He was educated at the high school, Hawkesbury, and Trinity College, Toronto, taking his science course with honors at the latter. In 1896 he removed from Ontario to British Columbia and for three years was engaged with mining companies at Rossland. After a short period spent in Colorado, he returned to British Columbia and was for a time connected with mining at Camp McKinney, in Boundary district. Later he was manager of the Greenwood Electric Light Co., which position he filled for some years. In 1908 he became superintendent of the British Columbia Copper Co.'s smeltery, under J. Edgar McAllister, the company's general manager, and when, last year, Mr. McAllister removed to New York, Mr. Warren succeeded him as general manager at Greenwood. In 1902 he married Miss Wilhelmina Hirsch, of Ingersoll, Ont., who survives him. For some years Mr. Warren was active in provincial politics, and was a well known member of the Conservative party in British Columbia. In 1907 he contested the Greenwood constituency for the Legislative Assembly of British Columbia, but was defeated. He was active in local affairs, having been connected with several clubs; an ardent supporter of field sports; and in other ways a prominent and useful member of the community in which he lived for about 12 years.

Societies and Technical Schools

Miami Engineering Society—The first regular meeting was held at Miami, Arizona, June 8. The society has about 30 members, consisting of the technical staff of the Miami Copper Co. General Manager B. B. Gottsberger is president, and Mill Superintendent F. W. Solomon, vice-president of the new society, which has been formed for the purpose of giving its members an understanding of the work being done outside of their own departments, thus broadening their knowledge of mine operation.

American Chemical Society—A circular from the secretary, dated July 10, says that a meeting of the Council will be held in New York Sept. 9, to consider changes in the Constitution made necessary by the growth of the society if its business is to be legally conducted. A general meeting of the society is called for Sept. 11 in the Doremus Lecture Theater of the College of the City of New York to pass upon any action taken by the Council if such confirmation is found to be necessary to secure proper legality. Out of courtesy to the Eighth International Congress of Applied Chemistry no meeting for the reading of papers will be held at this time.

Editorial Correspondence

From our Representatives at Important Mining Centers

San Francisco

July 11— A report has gained some attention recently that the thiogen process being tested at the Campo Seco smeltery in Calaveras County, has proven unsuccessful, and that another method is to be tried. This is not true. The thiogen process, invented by Doctor Young, of Stanford University, has not been abandoned, nor has it by any means been declared or found to be unsuccessful. The furnace is being improved and the experiments are still in progress. The recent improvements and developments in neutralizing the smoke are not made public and will not be until the experimental work is completed. Both the inventor and Superintendent Busey are satisfied with the progress so far made. The farmers in Shasta County are still making a show of fighting the Mammoth smeltery at Kennett, but are not likely to carry the matter to the courts again. The smeltery at Coram is still idle, but it is believed that if the Young process is proved to be completely successful, the Balaklala company will adopt it and the smeltery placed in commission again.

The reported evidence of Charles W. Eberlein, former acting land agent of the Southern Pacific R.R., in the government hearing regarding the Elk Hills lands, that he suspected the land might be oil-bearing at the time he made the non-mineral affidavit, is now denied by Mr. Eberlein; he is now reported as saying that he had no suspicion whatever that the land might be oil-bearing when he made the affidavit. The recent sessions of the hearing have included evidence as to the knowledge of the Southern Pacific officials that the lands were known or believed to be oil-bearing.

Denver

July 12—Like many other Colorado camps long dormant, but now much alive, is Creede. It was stated a few weeks ago in the JOURNAL that the Triune Mines Co. is sinking a three-compartment shaft from the old Amethyst level, intends to sink another on the United and a third on the New York and Chance, and is also building a 300-hp. electric plant in the town of Creede to electrify its mine and mill.

The Creede United Mines Co., a strong corporation, is carrying out plans which mean a large production in about six months' time. The company owns the North Creede, Park Regent, Reno, White Star Leasing Co., a 15-year lease on the Wooster tunnel, three miles long, and controls the 300-ton Humphreys mill at its portal. The tunnel is being equipped with a 60-hp. motor and 32-lb. rails, and will be driven 1000 ft. further, after which sinking, raising and drifting will be done. It is said that the work planned will take 18 months to accomplish, and will create 10 years of ore reserves. Since September the mill has been equipped with four Wilfley triple-deck slimers and a Norwalk compressor and three miles of air line have been added for the mine. Seventy-five men are employed. A. E. Humphreys is at the head and ex-Governor C. S. Thomas and W. H. Bryant, of Denver, are prominent members of the company. It is the same story with this company, that is heard from many others; ore left standing by the old workings as unprofitable, is now being mined and milled at a profit; last month $20,000 worth of concentrates were shipped.

From the Cresson mine on Raven Hill 2300 tons of $25 ore were shipped in June. The Victor mine on Bull Hill shipped 35 cars, the average being about $25 per ton. The Granite company shipped 85 cars, of a general grade of $30 per ton. The American Eagles shipped 10 cars of high-grade ore and the Abe Lincoln, in Poverty Gulch, five cars of mill ore. The output of the Isabella was 38 cars of 1-oz. gold ore. The flow from the deep-drainage tunnel is about 10,000 gallons per minute and the recession of water in the mines, for June, about 10 feet.

The ore conditions in the El Paso mine, since it was unwatered by the deep-drainage tunnel, are better than were anticipated. The first level drained was the 700, where it is said that the oreshoot is 1500 ft. long and 3 ft. wide, with average 1-oz. gold ore. This shoot will now be mined on the 800- and 1000-ft. levels. This vein system can be worked at 1350 ft., the drainage-tunnel level.

Fortunately for the legitimate and honest worker in mining in this state, it is becoming dangerous for fraudulent promotion schemes to be worked through the United States mails, for recently W. T. Wintemute, who was indicted two years ago by a Federal grand jury for this offence, was after a three weeks' trial sent to a federal prison for one year by Judge Hough in the U. S. District Court of New York. The fraud was in connection with the Gold Run Mining & Tunnel Co., of Boulder County.

Press dispatches state that an unusually severe cloudburst following heavy rains, broke over Cherry Creek on July 14, and the resulting flood that swept through Denver did heavy damage to property. The loss of life was small.

Butte

July 10—That the employees of the copper mines will not be the only ones to receive the increase in wages brought about by the recent contract entered into by the Anaconda company and the Butte Miners' Union, is evidenced by the fact that the management of the Butte & Superior company, operating a zinc mine, has declared its intention of following the lead of the Anaconda. Managers of all other properties being operated in Silver Bow County have also ordered the increase to be made. The contract applies to all members of the Butte Miners' Union, and has been carried into effect in all classes of mines, from the hill mines to those being worked on leases. On July 3, the contract was officially signed by a committee of the Miners' Union and by C. F. Kelley, vice-president of the Anaconda company, John D. Pope, manager of the North Butte company, and representatives of a number of other companies, and by the terms of acceptance, the scale went into effect beginning the first day of June.

At the Mountain View mine of the Anaconda, one of the cylinder heads of the engine used to operate the cages in the air-shaft, blew off on July 29, causing a cessation of work in that shaft until repairs can be made, which will require about 10 days more. As the work on the 1600- and 2000-ft. level was conducted solely through this shaft, nothing has been done there since. Up to the time of the accident a station 20 ft. wide, 30 ft. long and 20 ft. high had been cut on the 2000-ft. level, and a crosscut driven north 30 ft.; drifting had also been done for 20 ft. A 35-ft. sump has been cut below this level and a Knowles sinking pump is caring for the water, which amounts to between 15 and 20 gal. per min. at that point. A similar pump has been placed in the shaft at the 1900-ft. level, to assist the pump 100 ft. below. From this point the water joins the main flow from the mine, which is conducted into the High Ore mine through connect-

ing workings and lifted to the surface by the large pumps at the latter mine. To counterbalance the effect of the temporary loss of ore from the 1600-ft. level, the miners on that level have been put to work in reserve stopes in other parts of the mine, thus preventing any decrease in the daily amount of ore hoisted.

Salt Lake City

July 11—Work has been started at the International smeltery at Tooele on the installation of the third lead furnace, which has been found desirable on account of the increasing tonnage of lead ores being received and contracted for. The present sintering capacity has been found to be inadequate, and four additional Dwight & Lloyd sintering furnaces have been ordered. A large force of men is at work, preparing for the additions and work is also being done on a new lead bag-house system and other improvements. The International has recently established a branch office at Spokane, to secure ores from the Cœur d' Alenes, and has also opened an office at Goldfield, to obtain further consignments in that section. A contract has been made with the Nevada Hills company for concentrates from the mill at Fairview. The concentrates carry much silver, reported to be about 600 oz. per ton. The Marsh mine in the Cœur d'Alenes is shipping several cars per week to the International and is preparing to double its output. Four reverberatory furnaces out of five are in operation smelting copper ores. The chief source of supply is the Utah Consolidated, at Bingham, though smaller shipments of copper ore are received from other Bingham mines. A contract has recently been made with the Bingham-New Haven, and its ores, both copper and lead, will be shipped over the new Highland Boy tramway, when bins, which are being built at the terminal for this purpose, have been completed. The expert investigation as to damage by smeltery fumes near the smeltery, shows that no injury is being done.

The completion of the Strawberry tunnel, one of the largest engineering undertakings of the kind in the state or in the West, was celebrated at Spanish Fork, July 2. This tunnel is 19,000 ft. long and was driven by the United States Reclamation Service, under the direction of J. L. Lytel, project engineer, to bring water from the Strawberry River and Basin, into Utah Valley, to irrigate 60,000 acres of land in the southern part of Utah County. More than $2,000,000 was spent in the work. The last blast connecting the east and west end of the tunnel was fired by pressing a button during the ceremonies of July 2. The project will be fully completed next year, and it is expected that the land to be reclaimed will prove to be the equal of any farming land in the intermountain region.

Deadwood

July 11—Close observers in the Black Hills district are of the opinion that there are more prospectors working in this section than for a number of years. This appears to be true in view of discoveries reported and a cursory census of the outlying camps. This condition of affairs is naturally gratifying to residents of the Hills, as without the prospector plying his vocation the chances for discoveries of new properties are small. This stimulation is probably largely due to two factors, one being the inquiries for mining investments which are being received in increased numbers by local brokers, and the other without doubt being the free-assaying service for prospectors instituted last fall by the Deadwood Business Club.

Purchases of gold bullion at the U. S. Assay Office at Deadwood for the first six months of 1912, amounted to $3,832,000, according to L. P. Jenkins, assayer in charge. Of this amount $1,949,000 was purchased in the quarter ended June 30. All of this was South Dakota gold. This does not represent the entire production of gold for this district for the six months, as not all of the bullion output is marketed at this office, and the figures do not, of course, include the value of ores shipped to smelteries outside of the Hills.

Houghton, Mich.

July 13—The most interesting work that has taken place in this district for some years, is the deep vertical shaft being sunk by the Hancock Consolidated Mining Co. This company's land adjoins the Quincy mine on the south, and the deep workings of the latter, together with geological evidence, indicated that the Pewabic lode, worked profitably for several decades by the Quincy company, traverses the Hancock company's land. The outcrop of the Pewabic lode was not available on Hancock land, however, and to intersect the underlay at a desirable point required the sinking of a deep vertical shaft. It is generally understood that no deep drill holes were sunk, preliminary to shaft work. This shaft was started about six years ago, was planned to sink over 3000 ft. and is about 9x30 ft. in size. It is now over 3700 ft. deep and is believed by the management to have entered ground adjacent to the Pewabic lode, the objective point. As sinking has progressed, the shaft and top works have been completely equipped with the most modern appliances for handling the ore economically, from the stope to the mill. Even a millsite has been procured. Long before the zone of the Pewabic lode was reached, the shaft passed through hitherto unknown lodes, one of which, at least, has been shown to be valuable.

Negaunee, Mich.

July 13—The Crystal Falls district is active in shipping ore after several years of desultory operations and it is hoped that this situation will continue. The Corrigan-McKinney mines, the principal ones in the district, are shipping all the ore that can be hoisted and steam shovels are working at the Dunn, Tobin and Armenia mines with indications that these large stockpiles will be cleared up this season. The Great Western stockpile so far has not been touched; the Bristol mine of Oglebay, Norton & Co. is shipping ore from stockpile and the Hemlock mine of Pickands, Mather & Co., at Amasa, is active. The latter mine, which was diamond-drilled recently under the direction of Professor Leith, with indifferent results, is reported to have found the continuation of its orebody on the bottom level, giving it a new lease of life.

Toronto

July 12—As a result of the action of some of the Cobalt mine managers to suppress high-grading, which has been practiced extensively in spite of the increased severity of the law, John Mitchell, Robert Pearce, and Peter Cassells were arrested on July 7 charged with stealing 240 lb. of ore. George P. Williams, a Pinkerton detective, secured evidence against them. For several weeks he assumed the character of a theatrical manager and gained the confidence of the suspected men with whom he proposed to coöperate. The ore is stated to have been taken from the Timiskaming mine.

Four hundred men are working on the construction of the Elk Lake branch of the Timiskaming & Northern Ontario Ry. and 11 miles of grading have been completed, on which the rails will be laid as soon as they can be obtained. It is expected that the line will be completed before the end of the year.

Cobalt

July 12—Chief Justice Falconbridge has adjourned the suit of David Faskin against the Timmins-Dunlap-McMartin Syndicate, until Sept. 23 for further hearing. The basis of the suit is a claim by Mr. Faskin for $640,000, being a 10% commission on the sale of the La Rose mine by the defendants to E. P. Earle, Col. W. B. Thompson and associates in New York. In this transaction the plaintiff says he acted as the broker or agent of the owners of the La Rose. The defendants state that Mr. Faskin did not act as agent, but solely in the capacity of legal adviser and that he accompanied them to New York only for that purpose.

During June, 17 Cobalt mines shipped 1751 tons of ore as compared with 2173 tons for the corresponding period of the preceding year.

The Mining News

The Current History of Mining

Alabama

A petition seeking to throw the Southern Iron & Steel Company into involuntary bankruptcy was filed in the Federal court at Birmingham last week. Three local creditors, claiming amounts of less than $1000 due them, filed the petition. James Bowron, president of the company, issued a statement when officially informed that the petition had been filed, in which he announced that certified checks for the amounts claimed would be tendered to the petitioning creditors and the effort to throw the company into litigation resisted. A motion was made the following day before Judge W. I. Grubb, of the Federal court, offering a demurrer to the petition and asking for a hearing on the demurrer by a jury. This will have the effect of delaying the matter a while at least. President Bowron asserts that the Southern Iron & Steel Co. was doing well under the conditions. The company is a reorganization of the Southern Steel Co., which was in litigation a few years back. Much foreign capital is invested in the concern.

Alaska

Cable dispatches state that a stampede is in progress to a new gold field in the Aniak district. The first discoveries are said to have been made last autumn. The district is difficult of access and freight taken in by the Kuskakwim River must be transported up Aniak Creek in poling boats or small gasoline launches. Conditions are said to be encouraging.

Arizona

Gila County

Inspiration Consolidated—The main west shaft is 110 ft. deep and is sinking 5 ft. per day. The main east shaft has just been started. A headframe is being erected and a 25-hp. Fairbanks-Morse gasoline hoist installed. The Scorpion shaft was sunk 111 ft. last month. On the Inspiration orebody, the first haulage level is being opened 90 ft. below the tunnel level, 18 faces being worked. A large number of raises are being driven above the tunnel level. It is estimated that 16,000,000 tons of ore are extractable through the first haulage level.

Southwestern Miami—Churn-drilling continues steadily with fair progress. Holes 6, 7 and 8 are 550, 580 and 340 ft. deep respectively and are all in the schist formation. Hole No. 5, being drilled jointly with the Live Oak and the Barney, is 980 ft. deep in the same formation. None of the holes has yet reached ore.

South Live Oak—Churn-drill hole No. 2 has been started in the granite formation at a point about 500 ft. westerly from hole No. 1. The new hole is now over 175 ft. deep in iron-stained granite.

Globe-Ray—John Gibson, superintendent of the Independence mine 14 miles southwest of Miami, being operated by this company, is making arrangements to ship ore to the Old Dominion smeltery. About 200 tons have been mined and sorted and are on the dump. The ore runs 7% copper, 4 oz. silver and $4 gold per ton.

Copper Reef Consolidated—This mine is situated 12 miles from the railway and consists of 125 unpatented claims. Equipment includes: One Ingersoll-Rand, Imperial 10-hp. compressor, two Ingersoll-Rand, butterfly-valve, "C-110 rock drills and necessary equipment for compressor and drills; one 60-hp Stover engine; one pump for supplying mine and camp, and necessary pipes; tanks to receive 8000 gal. of oil, also a 2000-gal. supply tank. C. W. Saxman, San Carlos, is general manager.

California

Amador County

Zeila—Thirty stamps have been hung up while preparations are being made for the development of the orebody on the 140-ft. level.

Memphis—This mine near Plymouth is being opened. The installation of a 5-stamp mill is contemplated. The Memphis Mining Co. is the owner and J. E. Sciaroni is superintendent.

Hardenberg—The new vertical shaft has been sunk to 1025 ft. N. S. Kelsey, of Jackson, is superintendent of this mine and the South Amador. The properties are owned and operated by the interests that own the South Eureka and Oneida.

Butte County

Forbestown Consolidated Gold Mines—The Gold Bank group has an inclined shaft 1600 ft. deep, the bottom of which intersects the Gold Bank 8x8-ft. working tunnel. The Forbestown fissures are about 8 ft. between walls, carrying $8 in gold, with some silver and copper. M. J. Cooney, Oroville, is president.

Calaveras County

Lightner—A 10-ft. vein of good ore is reported to have been disclosed at the 900-ft. level. It has been contended that this and other mines in Angels Camp would be found to carry pay ore after the talc intrusion had been passed. B. C. Clark, of Angels, is superintendent.

Eldorado County

Adjusta—It is reported that good milling ore has been disclosed and that a new stamp mill will be installed. C. A. Ingraham, of Placerville, is the owner.

Mariposa County

Marble Springs—J. A. Flink of San Francisco, has taken a purchase option on this mine near Kinsley. Mr. Flink recently purchased the Deer Flat mine near Coulterville.

Modoc County

Sunshine—Several wagonloads of ore from this mine were hauled to New Pine Creek for rail shipment on July 4.

Hess—This mine, 32 miles southwest of Modoc, is leased by P. A. Keegel and J. L. Harvey. The ore is treated in an uptodate 10-stamp mill; the sands are treated by percolation and slimes agitation and a saving of 90% of the assay values is reported. Steam and electric power are used. W. D. Bridges is in charge at the mine and P. A. Keegel, Adin, is general manager.

Nevada County

Black Bear—This mine in the Rough-and-Ready district is being reopened. Mr. Woods is superintendent.

Mountaineer—Gold-bearing ore has been opened. The mine adjoins the Champion. P. and J. Bender and F. J. Sloat, of Nevada City, are owners and operators.

San Bernardino County

Oro Belle Mines Co.—This property at Hart consists of 52 acres of mineral land. A water supply has been developed on two millsites owned by the company, 1½ miles from the mine. Equipment for the delivery of water to the mine has been installed. The vertical shaft is timbered to a depth of 560 ft. and approximately 3500 ft. of development have been done. W. B. Andrews, Duluth, Minn., is president and general manager.

Shasta County

The statement of the county assessor of the assessed valuation of Shasta County property shows a decrease of about $60,000 at Coram caused by the closing of the Balaklala smeltery. The

total is thus reduced to $24,600. The total at Kennett, where the Mammoth smeltery is still in operation, is $205,950.

Sixteen-to-one—An attempt is being made to treat the sulphurets at this mine, one mile below the Oakman, by heap-roasting the slimes and concentrates.

Red Ledge—The leasers of this mine, south of Washington, have relinquished their bond. The property has reverted to the Williamson brothers.

SOLANO COUNTY

Pinal Dome Oil Co.—This is a new incorporation, capital stock $4,000,000, organized to prospect and develop oil lands in this county.

YUBA COUNTY

Marc Antony—The old shaft of this mine, at Smartsville, is being cleaned out preparatory to exploring the orebody that was opened at a depth of 200 ft. about 40 years ago.

Colorado

CLEAR CREEK COUNTY

Mineral Chief—The mill, which is operated under a 5-year lease by Stephens & Old, started on July 8 with two 12-hr. shifts and it is expected that about 70 tons of ore per day will be concentrated. Twenty men are employed in mine and mill.

Creede—In the Wooster tunnel a station 70 ft. high has been cut by J. H. Berkshire & Co., of Kansas City, lessees, who will install machinery and sink a shaft 500 ft. They have a 20-year lease on the Creede United properties below the tunnel level.

Black Eagle—Lessees have recently made small shipments. Work is in progress on the 200- and 250-ft. levels near the shaft. The vein is about 2 ft. wide.

Oneida—John Owen, manager, has been making a series of cyanide tests on the lower-grade ores to determine the advisibility of erecting a cyanide plant. Preliminary results have been satisfactory.

Kelly—The compressor and mill at this tunnel are being overhauled preparatory to early resumption of work. At present development is conducted through the Moline tunnel on the New Boston vein. Dr. H. O. Marcy, of Boston, is the principal owner.

La Plata—An 8-in. vein of 230-oz. silver ore was recently opened by Joseph Broad, manager and principal owner, and he estimates that a small output can be maintained.

Humboldt—One new Wilfley table has been added to the milling equipment and ore from the Lamartine dump is being treated.

Capital—The company is installing equipment to drill an 8-in. horizontal hole for air purposes, a distance of 1100 ft., to connect with the ninth level of the Capital Prize mine.

Roadside—Development of the claims in Spring Gulch has been resumed under Ira Pollard, superintendent.

LAKE COUNTY-LEADVILLE

Park—During the last month Mankuss & Anderson shipped nine cars of iron ore, and six tons of high-grade gold ore from the Park lode in Adelade Park.

Lafayette—The five Lafayette claims at the foot of the Mosquito Range, are being operated under lease by E. M. Moorman, of Denver, with G. Nicholson as superintendent.

East Lake Creek—D. Thomas, superintendent, is driving a tunnel, now in 3200 ft., and he has driven 600 ft. of laterals on intersected veins.

Ella Beeler—A 2-ft. vein has been opened in this tunnel by A. S. Sharp & Co., 1800 ft. from the portal.

Small Hopes—Frank Zaitz, of Leadville, manager, is doing systematic development and is driving for the zinc orebodies in the Forest City ground.

OURAY COUNTY

The first train from Silverton into Ironton arrived July 1 and will begin hauling ore from the Barstow and Joker lease. The Gennessee and Congress mines are stacking high-grade ore for shipment to the railroad.

Wanakah—The Bright Diamond and Memphis groups, 13 claims, have been deeded to this company, John T. Roberts, Jr. manager.

Brown Mountain Smelting and Refining Co.—A. C. McCall, president, states that on Aug. 1 the smeltery will begin to buy ore.

Tomboy—During June the mill crushed 10,000 tons of ore, yielding bullion worth $17,000; concentrates worth $89,500 were shipped. Gross receipts were $106,500; expenses, $46,000; profit, $60,500. During the month $13,714 were spent on permanent improvement.

TELLER COUNTY-CRIPPLE CREEK

Jerry Johnson—The output for June was 25 cars of $18 ore, from a new vein on the 550 level.

Gold Sovereign—Royalties from leasers are running about $1200 per month.

Henry Adney—Two cars of ore have been shipped from a new oreshoot and shipments are expected to be increased.

Mary McKinney—The main shaft has been sunk 190 ft. since the unwatering by the deep drainage tunnel and will be sunk 40 ft. more and the ninth level opened.

Modoc—Five cars of smelting ore were shipped during June.

C. K. & N.—The output for June was 27 cars of ore.

Idaho

BLAINE COUNTY

Minnie Moore Mines Co.—This company, recently organized with a capital of $500,000, has purchased the properties and equipment of the Idaho Consolidated Mines Co., including a new 150-ton mill. The property was purchased, together with the 600-kw., hydro-electric power plant, at a receiver's sale on June 10, by L. R. White, formerly connected with the Idaho Consolidated. I. E. Rockwell is president and general manager, John A. Blomquist, of Boise, vice-president and L. R. White secretary. Mr. Rockwell will be in charge and active development will be done.

Lipman—It is reported that the Mayflower, Bullion, Jay Gould and Red Elephant mines have been combined into one company and that this tunnel will open the properties at a depth of about 600 ft. below the present deepest workings. J. W. Sawyer, mining engineer, will be in charge.

LATAH COUNTY

Mizpah Copper Mining Co. Ltd.—The company is installing an air compressor and drills, as hammer drills have been found too light for the formation in No. 5 tunnel. Vein No. 4 is 50 ft. wide and one car shipped ran 6% copper and $3.60 per ton in gold. It is hoped to commence shipping from the 250-ft. level soon. The ore will be hauled with teams or power trucks to the railroad until the latter is constructed to the mines. It is expected to grade the ore to about 10% copper and to ship one car per day for the present. The property is situated in the Hoodoo district in Latah County; Palouse, Wash., is the nearest shipping point. J. C. Northrup, Palouse, Wash., is manager.

Michigan

COPPER

In the JOURNAL of June 15, 1912, page 1199, we stated that the Algonquin company had been organized by R. C. Pryor, Hayden, Stone & Co., and Paine, Webber & Co., of Boston. We are informed that neither Hayden, Stone & Co. nor Paine, Webber & Co. have anything to do with this corporation, our correspondent having been in error.

Isle Royale—The mine is gradually increasing production. The company is handicapped in securing additional underground labor. A head in the Lake Milling company's plant will be used to handle the increased tonnage, and the concentrating department has recently been remodeled along modern lines.

Laurium—The shaft is temporarily bottomed at the 13th level, with drifts extending from the 11th, 12th and 13th levels. No stoping has been done and the ore is being stockpiled.

Oneco—This company is drifting north and south at the 11th and 12th levels. The lode is about 20 ft. wide, carrying copper throughout with about 3 ft. of it highly mineralized.

Calumet & Hecla—The construction work at Lake Linden is going forward satisfactorily. The piling for No. 2 regrinding mill has been completed and the foundation for the electric power plant extension is completed and ready to receive the structural steel which will be on the ground soon.

Hancock—No. 2 shaft is bottomed again in a copper-bearing formation which was encountered at about 3720 ft. depth. The lode has been opened for 10 ft., shows an encouraging amount of copper and the formation is of a more uniform character than any of the other formations that have been exposed recently. The management has not yet pronounced it the Pewabic lode, but it has the characteristics of that formation.

Iron

Oglebay, Norton & Co.—A general strike of miners has occurred at the Montreal and Ottawa mines on the Gogebic range. The men object to the company's interpretation of the contract system, claiming that when they make good wages the latter are cut down.

Cleveland-Cliffs Iron Co.—As an auxiliary to the new power plant at Marquette, the company is preparing to build a dam at Forty-acre Falls, on the Carp River north of Ishpeming, for water-storage purposes.

McPherson Exploring Co.—This company is drilling a hole on the site of the new Chicago & Northwestern Ry. union station for Iron River and Stambaugh. The fee owners desire to know if there is iron formation on the land, before building commences.

Montana

Butte District

Anaconda—At the Mountain View mine about 730 men are employed in underground and surface work, and an average of between 1800 and 1900 tons of ore per day is being shipped to the smeltery. On the 1400-ft. level a more direct haulage route for ore from the northeast vein system to the main hoisting shaft has been nearly completed, and within a month this ore will be hauled at a considerable saving in distance. Horses are still being used on the ore trains on this level, but heavy steel has been laid in preparation for the installation of electric motors, which will be made soon.

Broadwater County

East Pacific—R. A. Bell, owner of this mine near Winston, has given a lease and bond to J. H. Longmaid, of Helena. The mine was formerly worked through four main and four intermediate tunnels. Mr. Longmaid is having an examination made before starting operations.

Cascade County

Block P—The Barker Mines Co., which has been operating this property near Neihart for some time, has had the lease extended with an option to buy. The property comprises two quartz claims and a full complement of surface buildings and mining machinery.

Jefferson County

Elkhorn—Operations are still being carried on in the upper levels by the Longmaids, of Helena, and work will be continued for about a month before abandoning the mine. The pumps were pulled several months ago but the water has risen only to the 1400-ft. level and it will probably be six months before the upper levels are entirely flooded.

Madison County

Copperville—E. C. Hosner and the Elling estate, owners of this group of claims 12 miles from Virginia City, have sold the property to Butte men. During the last few years Mr. Hosner has done considerable development on the property with good results and the new owners will continue work. They intend to erect a mill eventually.

Bedford—Work has started on the construction of a road from the railway near Laurin to this mine, eight miles up Ramshorn Gulch. The property has been developed during the last two years by the Watters Tunnel Co. and a quantity of silver-lead milling ore blocked out. Preparations are being made to erect ore bins and shipments will begin soon.

Betsy Baker—Men are at work on this and the Gold Coin claims adjoining the Bedford mine. This property contains principally gold ore, with some silver and lead. William Walker and Martin Johnson, of Virginia City, are the owners.

Nevada

Churchill County

Copper deposits are said to have been found recently on the east side of the Silver Range, near Dixie Springs. These properties are owned by Winnemucca men.

Paul G. Reid has recently discovered a new district, called Adaven, about 35 miles west of Lovelock. The ores are silver-lead and carry about 4½ oz. of silver for each per cent. of lead.

Nevada United—This company, operating in the White Cloud district, is reported to have one vein 20 ft. wide, carrying 8% blende.

Mines Development Co.—This company, operating at Juniper Mountain, contemplates the installation of machinery with which to sink a shaft to 1000 ft. depth.

Comstock Lode

Ward—A flow of water has been tapped in the south drift, which is reopening old ground on the 2150 level of the Bullion, and the drainage has resulted in lowering the water 5 ft. in the Yellow Jacket incline, joint Crown Point and Belcher incline, and the Overman shaft. The drift has been advanced, its objective point being the old bulkhead constructed years ago to hold back the Gold Hill water. The Starret pump, which was secured to unwater the Ward shaft from the 2200- to the 2475-ft. levels, has been lowered into place.

Belcher—Exploration in the ore streak on the 1400-ft. level is being continued north and south from east crosscut No. 3; the material saved is being stored in the mine, pending repairs to the Yellow Jacket shaft.

Crown Point—Ore taken from the stopes on the 1400 level, is being stored in the mine. Run No. 7 has been completed at the Yellow Jacket mill, and a car of concentrates shipped to the smeltery.

Yellow Jacket—Extensive repairs are being made to the main hoisting shaft. The mill has been shut down while repairs are made to the sills and foundations.

Mexican—Five bars of bullion were shipped from the mill last week worth $17,000. There remain on hand to be shipped, bullion and precipitates worth $11,000.

Douglas County

Pittsburgh-Liberty Mining Co.—A petition has been filed asking that this company be declared an involuntary bankrupt. It is reported that the company owes about $40,000.

Buckskin-National Gold Mining Co.—The winze from one of the tunnel levels is reported to have disclosed gold ore. At a depth of 50 ft. a drift has been driven on the orebody. The vein matter is a highly altered porphyry, impregnated with iron sulphides carrying gold. Development consists of tunnels, opencuts and a winze.

Esmeralda County

Blue Bull—The retimbering and enlarging of the 400-ft. shaft on the Hat claim is progressing about 10 ft. per day.

Pioneer Consolidated—The company recently lost its gallows frame and hoist house by fire, with serious damage to the machinery.

Gold Mountain Mining & Milling Co.—The company is arranging for the construction of a 10-stamp mill on its property of seven claims in the Hornsilver district. The ground has been developed

by leasers and four shafts, from 30 to 260 ft. deep, have been sunk.

Loriette—It is reported that the management of this company is surveying for an electric line from a point in Deep Springs Valley by way of Soldier's Pass to the Swab property. Power will be obtained from the Goldfield power line. A depth of 800 ft. has been reached and ore is being found.

Humboldt County

Sulphur—Operations have been resumed by E. D. Rogers, superintendent. Conditions have been improved by the recent development of new bodies of sulphur.

Comet Placer—Two wheeled scrapers are being employed to scrape off the surface. This material is carted some distance and run through sluice boxes, the black sands being saved on Wilfley tables.

Nye County

Shipments in tons from Tonopah mines to date and for the week ended July 6, are as follows:

Mines	Week	Year to Date
Tonopah Mining	3,500	89,919
Tonopah Belmont	1,950	54,576
Montana-Tonopah	1,030	27,622
Tonopah Extension	1,078	26,335
West End	750	19,209
Midway	.....	180
MacNamara	469	10,072
North Star	.....	80
Totals	8,777	227,993
Estimated value	$219,425	.....

As a consequence of the recent development in the Tonopah Merger mine, work is to be resumed on the Cash Boy, Golden Crown and Sully properties in that vicinity.

Tonopah Midway—The mine shipped to the smelters in the week ended July 12, 40 tons of $50 ore, and 40 tons of $70 ore.

Tonopah Extension—The management states that after the payment of the recent dividends the company had a cash balance of $135,000. In the last three months ore reserves have been increased and the average grade of the ore has improved. The output for June was the largest since the mill was started.

MacNamara—The output of the mill for 15 days ended July 9 was 912 lb. of bullion, worth $10,600, from 1006 tons of ore.

Tonopah-Belmont—There was some delay in starting the new mill but the crushing plant was started on July 9 and is crushing 500 tons per shift. About 2000 tons will be placed in the mill bins before dropping the stamps.

Tonopah Mining—The report for May states that 14,948 dry tons were milled, averaging $18.08 per ton, returning 254,700 oz. of gold and silver bullion worth $206,700, and 100 tons of concentrates worth $34,350. The net profits for the month were $141,152.

White Pine County

Reports state that Frank C. Armstrong, of New York, has secured control of the Coppermines Co., including 550 acres of mineral lands and 3000 acres of ranch lands, and millsites. The property adjoins the Ruth claim of the Nevada Consolidated.

Giroux—J. B. Cotton, vice-president, is reported to have stated recently that June shipments from the Brooks and Bunker Hill mines totaled more than 23,500 tons and that they have averaged 1000 tons per day so far this month. Part of these shipments were from stock pile and part from the mine. From now on all shipments will be made from underground and will be kept up to the limit of the contract with the Steptoe plant.

New Jersey

It is stated that the recent public sale of the Green Pond iron mines, near Rockaway, a portion of the holdings of the Carteret Steel Co., was not confirmed by the court in consequence of a legal error, and that the property will again be sold, probably in September or October, by W. I. Lewis, Master in Chancery, of Paterson, New Jersey.

New Mexico

Grant County

Atwood—This mine, three miles from Lordsburg, is owned and operated by the Atwood Copper Co., A. W. Morningstar, manager. The main working is 310 ft. deep. Three levels, at 75, 148 and 210 ft., were started by the former operators. Two veins carrying gold, silver and copper have been found on the 210-ft. level. Drifting has opened 4 ft. of ore on the south vein, and 12 ft. on the middle vein. Ore from development is shipped to the Copper Queen smeltery at Douglas, Ariz., where it is used for converter lining. The shaft is sinking at about the 300-ft. level and pockets have been installed on the 200-ft. level and will be placed at each level as work progresses. New hoisting machinery has been ordered, loading bins have been arranged on surface with grizzlies and sorting tables, and a 48-ft. headframe is in place. It is the intention to install milling machinery when further development has been done. J. L. Wells, Lordsburg, is consulting engineer.

Oregon

Baker County

North Pole—The mine has been closed down and the men discharged, due to failure to open the orebody and the exhaustion of funds.

Dixie Meadows—This mine near Prairie City is closed down and the supplies and equipment are being sold.

Red Boy—A tube mill, recently purchased from the Cougar mine, is being installed.

South Dakota

Lawrence County

Wasp No. 2—The mill capacity has been increased to 520 tons per day. Mill heads have averaged a little under $2 per ton for the last two months. Returns from a recent shipment of high-grade smelting ore were $158 per ton. The orebody is small and it lies under the main low-grade orebody; it is removed as the mill ore is taken out.

Kiemer Gold Mining & Milling Co.—This company was recently organized at Deadwood with H. Kiemer, president; Olaf Seim, vice-president; Mrs. E. R. Kiemer, treasurer and Jesse Simmons, secretary. The company owns 210 acres adjoining the city limits of Deadwood on the southwest. A body of porphyry ore may possibly be cyanided. Development is under way.

Homestake—The work of connecting up individual motors to the rock crushers at the shafts has been completed and the entire crushing and stamping department is being operated by electricity.

Bismarck—Construction work at the cyanide plant, at Flatiron, adjoining the Wasp No. 2, is being pushed, and it is expected that the mill will be in operation in the early autmun.

New Reliance—The recent assessment is intended to take care of indebtedness and provide funds for work. The property has a body of mill ore, and a 30-stamp cyanide plant, in the Bald mountain district.

Trojan—The mill is handling 180 tons per day in the first unit, and preparations are being made to place the second unit in operation. Charles E. Ellis is mill superintendent.

Utah

Juab County

Tintic shipments for the week ended July 5 amounted to 138 cars, the output being smaller than usual on account of the Fourth-of-July intermission.

Gold Chain—During the year the company has shipped about 300 cars, which is in excess of the total production of the preceding year. Receipts for June are stated to be about $20,000. The new orebody on the 700 level is opening up well.

Eagle & Blue Bell—There were shipped from the 700-ft. level and winze during June, 221 tons of ore worth $21,731. Ore marketed from the 1300 level during the same time amounted to $14,000, bringing the total reported production for the month to $35,000.

Eureka Hill—There is talk of resuming operations at this mine worked by leasers during the last year.

Opohongo—Work on the 1000-ft. level has been temporarily discontinued to al-

low for new development on the 600. The company's power is insufficient.

May Day—Three cars of zinc ore amounting to 125 tons have been shipped, bringing in about $3600. Ore of this character is being accumulated, pending the adjustment of freight rates. The Knight Power Co. has contracted to furnish power for the new electric hoist.

Majestic—During June, 16 cars of ore were shipped from the Old Hickory and 10 cars were broken down in the mine, ready for shipment. Returns on two cars gave $8.84 per ton, including all charges except freight, which amounts to $1.75 per ton. July shipments will be increased.

Victoria Consolidated—A crosscut has been driven 15 ft. in ore of shipping grade, on the 1200 level. This is thought to be the same ore as that opened on the 1050 which gives much stoping territory. There are about 700 ft. of ground on the north, and also unprospected territory on this vein south of the shaft.

SALT LAKE COUNTY

Ohio Copper—At a special meeting in Portland, Maine, July 1, the plans for reorganization were ratified by the stockholders. Statements have been forwarded to stockholders.

Yampa—The aërial tramway is being overhauled preparatory to resumption of work.

Montana-Bingham—The tunnel is in 1100 ft. and progress of about 4 ft. per day is being made. The face is still in Montana-Bingham territory.

Michigan-Utah—A consignment of 131 tons has been marketed, bringing about $40 per ton. Regular shipments are being made. The reconstruction of the old 4½-mile tramway from the City Rocks mine to Tanners Flat is to be started soon.

South Hecla—Working forces have been gradually increased to 16 men. No. 3 drift is following a fissure mineralized with copper and silver. Work has also been started in the Wedge fissure. G. H. Watson is in charge.

Emerald—Work has been started by San Francisco men.

Alta Consolidated—During June, settlements were received on three lots of ore, which are said to have brought in more than $10,000. The last lot sampled as follows: Silver, 75.4 oz.; lead, 11%; copper, 5%; silica, 26%; zinc, 11.02%; sulphur, 24.8%; speiss, 1%; iron 13%. A. O. Jacobson is superintendent.

Columbus Consolidated—A good showing is reported on the upper levels. The lower part of the mine is under water.

Cardiff—Shipments were expected to begin July 8, and will continue throughout the summer. Shipping ore averages from $40 to $50 per ton.

Neva—New directors have been elected for this property near the Cardiff. It will be inspected by them soon with a view to resumption of development.

Tar Baby—A mineralized fissure has been cut in the tunnel, now 330 ft. long.

Silver King Coalition—The annual report for the year ended Apr. 30, 1912, shows that during the year 21,506 dry tons of first-class ore and 86,387 tons of second-class ore were mined, from which concentrates amounting to 14,106 tons were produced. The ratio of concentration was 6.12: 1. The average assay value of the crude ore was 28.35% lead; 50.06 oz. silver; 0.0551 oz. gold. Ore sales brought $1,265,808, and leasers' royalties, $6895, which, with $4933, miscellaneous income, brought total receipts to $1,277,687. Disbursements, including the purchase of the Uintah-Treasure Hill Coalition Mining Co.'s property, amounting to $910,626. There was cash on hand, Apr. 30, $367,011. Electric haulage was installed in the Alliance and on the 900 level, ventilation has been improved and the mill, sampler and tramway are now operated by electric power.

TOOELE COUNTY

Norma—The company is operating the old Helvetia, or South Daisy mine. This is the property that was unsuccessfully operated by the Daisy Combination Gold Mining Co., two years ago. The mine has a strong shoot of $6 ore on the 600 level, and prospects appear favorable. The company has leased the Daisy mill, and is remodeling it, so as to duplicate practically the Boston-Sunshine installation. The ore will be crushed in a rock-breaker and rolls, and classified into sand and slime with Consolidated Mercur mixer-classifiers and Dorr classifiers. The sand will be sluiced to leaching tanks, leached, and tailing sluiced out. The slime will go to a Dorr thickener, and thence to a Moore filter. Zinc-shaving precipitation will be used. The plant was designed by George W. Wood.

Wisconsin

The district is suffering from a shortage of miners, laborers and teams.

Wisconsin Zinc Co.—The company recently took over the East End lease. A good run of zinc ore was shown by churn drill and shaft. Work of moving the Acme mill to the East End has commenced.

Trego—The mine is in operation again under the management of C. C. Mathey.

Norcross—Mining and milling has been resumed with new pumping equipment.

Vinegar Hill—The company has reopened the Brown mine at Shullsburg.

Federal Lead & Zinc Co.—The company has taken over the Jack-of-Clubs mine at Benton.

Baxter—This former large producer at Cuba City has been purchased from the Janesville owners by men associated with the Frontier company and work will be resumed.

Raisbeck—This old mine at Benton has been taken over by the Vinegar Hill company and a mill has been erected.

Cleveland—This mine at Hazel Green has developed a body of zinc ore from which about 200 tons per week of concentrates are being shipped.

Sally Waters—This mine is being unwatered by the Selivier Mining Company.

Rowley—This mine, at Strawbridge, is shipping regularly under the management of the Vinegar Hill company.

Wyoming

Platinum Mining & Milling Co.—This company, which is now operating the New Rambler mine, has shipped some of the raw ore but is now remodeling the concentrator. It is stated that results from ore shipments have been satisfactory. At present ore is being stockpiled and this will be treated later in the concentrator. It is expected to ship the concentrates to Germany. Julius Thielman is president and general manager, at Holmes, and W. M. Ruggles is mine superintendent.

Beck—One successful trip has been made with a 60-hp. Rumely oil tractor, from Rock Springs, from which point future freighting will be done to the mine at Atlantic City. Custom freighting also will probably be done. The mine is 36 miles from the Chicago & Northwestern Ry. and 90 miles from the Union Pacific railroad.

Canada

ALBERTA

Keystone Portland Cement Co.—This company which is backed by a syndicate of Belgian men, will construct a cement plant at Blairmore, at a cost of about $400,000. The plant will be one of the largest in Canada with a capacity of 1500 bbl. per day and is to be completed early in 1913.

BRITISH COLUMBIA

Le Roi—The concentrator built in 1904 near the mouth of the Black Bear tunnel to concentrate the low-grade ores on the dumps, and used only for a short time, is now being equipped with a 30-ton unit of the Elmore Vacuum Process, Callow screens and Wetherill separator. These machines will be used to concentrate the siliceous ores of Le Roi mine.

Centre Star—The assay office was badly damaged by fire on June 6. The assay office at Le Roi mine is being moved near the Centre Star orebins where a concrete foundation has been

laid for it. The assaying for the mines of the Consolidated company in Rossland will be done on the new site. The change will greatly facilitate the work.

Blue Bird—A 3-drill compressor and a 60-hp. boiler are being installed. Shaft sinking will be resumed when the machinery is in place.

Rambler-Cariboo—A shoot of high-grade silver-lead ore has been found on the 1400-ft. level. It is calculated that the main shoot is still about 100 ft. ahead.

Slocan Star—The crosscut being driven at depth is in between 1600 and 1700 ft. Progress is at the rate of about 10 ft. per day. The distance yet to be driven is 500 to 600 feet.

Ontario

Explorations for oil and platinum are being conducted south of Chelmsford, near Sudbury. The platinum is supposed to occur in veins with arsenical iron pyrites, in the slate. The oil indications are also in the slate, near the occurrence of so called coal, the anthraxalite of the Canadian Geological Survey. This district was once drilled for coal.

Long Lake—Work at this gold mine, northwest of Sudbury, has been suspended pending the installation of power facilities. Equipment includes a 20-stamp mill and extensive development has been under way for two years. The ore is quartz containing about $9 per ton in gold.

Ontario—Cobalt

Shipments of ore and concentrates, in tons, from Cobalt for the week ended July 12, and for the year to date, are:

La Rose	.....	1,891.57
Coniagas	32.95	1,143.63
O'Brien	.....	276.23
Right of Way	.....	153.46
Chambers-Ferland	.....	225.50
McKinley-Darragh	106.71	1,457.86
Nipissing	31.25	1,160.60
Hudson Bay	32.54	408.27
Buffalo	26.65	669.07
Crown Reserve	22.99	302.08
Cobalt Townsite	42.00	810.63
City of Cobalt	.....	812.51
Tretheway	.....	283.54
Colonial	.....	41.60
Kerr Lake	.....	424.14
Cobalt Lake	.....	341.69
Drummond	.....	330.30
Temiskaming	.....	586.91
Beaver	.....	180.90
Wettlaufer	.....	111.21
Provincial	.....	22.22
Casey Cobalt	99.80	212.15
Lost and Found	.....	15.00
Totals	394.89	11,504.63
Bullion shipments in ounces		
Nipissing	65,822.80	1,976,732.29
O'Brien	13,219.00	112,147.72

Nipissing—The output for June was worth approximately $225,162. The high-grade mill treated 181 tons, bullion shipments amounting to 326,278 oz., worth $198,824. The hydraulic operations have led to the exposure of new veins. An extension to vein 92 has been disclosed carrying from 1 to 2 in. of high-grade ore and two other veins have been found. Vein No. 73 continues to be the principal producer.

Cobalt-Majestic—This company, now in liquidation, is paying all creditors' claims in full, one of its properties having been sold. It is hoped that the proceeds of the remaining claims, one of which is said to be of considerable merit, will enable a dividend to be paid to the shareholders.

Crown Reserve—The construction of a power house will be commenced soon, so as to render the company independent of outside assistance in development work. By Oct. 1 power is expected to be available.

Ontario-Porcupine

Pearl Lake—Air for mining purposes is being obtained from the Plenaurum, on account of the air-compressor motor having been burned out.

Fisher-Baubion-Bonneau Syndicate—This company's property in Shaw township is being tested with diamond drills. The results are stated to be encouraging.

Dome Lake—The company has decided to erect a 10-stamp mill. Three shafts are being worked and the results of underground development are satisfactory.

Porcupine-Hudson Bay—This property is being examined for New York men.

Krist—This property is being developed by German men. A 50-ft. shaft will be sunk and diamond drilling carried on from a crosscut at the bottom.

Hollinger—The first clean-up of the new mill resulted in a $5000 brick. Gilbert Martin, an electrician's helper at the McIntyre, was killed on July 5, at the transformer house at the Hollinger property, by falling against a high-tension wire.

Hughes—The installation of the new compressor and steam plant on this property has been completed and development work resumed.

Ontario-Sudbury

Mond Nickel Co.—The company is developing a portion of the Froud deposit, purchased from W. McVittie about a year ago, and is sinking a vertical shaft to 1000 ft. depth. The drilling on the Blue Lake property, belonging to McVittie and Cochrane, has been concluded and the option has been relinquished. The new plant at Conniston will not be completed for another year. Extensive equipment is being provided and the ultimate capacity will probably be about 1000 tons per day. This plant will supersede the 300-ton works now in operation at Victoria.

Dominion Nickel-Copper Co.—This company has resumed drilling at the Murray mine.

Moose Mt.—The Gröndal magnetic-separation plant this company is building, will soon be ready to make a test on one unit, which will also include the Jordan impact pulverizer.

Mexico

Jalisco

Mezquital del Oro—This gold mine north of Guadalajara is under option to an American syndicate. It was extensively developed and operated by a British company but has been idle for several years, except for intermittent periods.

Mexico

El Oro—During June the mill treated 20,030 tons of ore and 15,020 tons of tailings, yielding bullion worth $160,980. Working expenses were $92,350 and $14,860 were expended on development. Permanent mine improvement cost $4640 and total profit, including railway, was $69,040.

San Luis Potosi

La Bufa—About 30 men are employed at this mine near Charcas, and owned by the Empire Zinc Co. J. S. McKinnon is manager.

Tiro General—The standard-gage railroad from Los Charcos to this mine, a distance of eight miles, is nearly completed and ore shipments over this line will soon be increased. About 1200 men are employed in the mine and on the railroad. S. F. Shaw is superintendent.

Sonora

Muchacho Grande—Work on this property on the Mayo River, north of Alamos, has been suspended for some time owing to the unsettled conditions. It is expected that development will be resumed soon and that a concentrating plant will be installed. W. R. Layne is manager.

Lucky Tiger-Combination Gold Mining Co.—A report for the first four months of 1912 shows that net profits from operation were approximately $45,000 per month. The net profit for May was about $75,000, of which $37,000 came from the operation of the cyanide plant, which is working well. During May 6183 tons of ore were concentrated; tailings cyanided, 7728 tons; estimated value of shipping ore, $30,000; concentrates, $64,200; bullion from cyanide plant, $70,400; total May production, $164,600. Considerable high-grade shipping ore has been discovered on the fourth level of the Sooy vein. The directors have voted to observe a more conservative policy in the future as regards dividend disbursements.

South America

Chile

Braden—The indications are said to be that the preliminary figure of 23,000,000 tons ore reserves, assaying 2½% copper, may be exceeded in the final estimate. The Teniente orebody is being developed by the Teniente tunnels which are reported to be in ore at present.

The Market Report

Current Prices of the Metals, Minerals, Coal and Mining Stocks

Coal Trade Review

New York, July 17—Coal trade in the West continues rather slow, and it is evident that large consumers have not come around to the point of putting in stocks. Possibly they will not until supplies are less abundant and pressure to sell less strong. Lake trade is in pretty full swing and promises to show a good season.

In the East the Seaboard bituminous trade is exceedingly dull and prices low. Anthracite business is better up to the mark, but is not especially active. The pinch in this trade will come later, when the April and May deficiencies have to be made good.

Coal movement through Sault Ste. Marie Canals, season to July 1, short tons:

	1911	1912	Changes
Anthracite	520,000	224,908	D. 295,092
Bituminous	3,689,282	3,715,397	I. 26,115
Total	4,209,282	3,940,305	D. 268,977

The decrease this year was entirely due to the light anthracite shipments in May.

German Coal Trade—Exports and imports of fuel in the German Empire five months ended May 31, metric tons:

	Exports	Imports	Excess
Coal	13,022,847	2,997,757	Exp. 10,025,090
Brown coal	23,124	2,934,312	Imp. 2,911,188
Coke	2,208,802	220,702	Exp. 1,988,100
Briquettes	1,096,780	75,381	Exp. 1,021,399
Total	16,351,553	6,228,152	Exp. 10,123,401
Total, 1911	13,384,462	7,513 176	Exp. 5,871,286

Exports this year included 9583 tons of coke to the United States.

German Coal Production—Production of coal and coke in the German Empire five months ended May 31, metric tons:

	1911	1912	Changes
Coal	66,334,976	70,817,532	I. 4,482,556
Brown coal	30,002,035	33,212,644	I. 3,210,609
Total mined	96,337,011	104,030,176	I. 7,693,165
Coke made	10,558,503	11,439,556	I. 881,053
Briquettes made	8,722,322	9,683,358	I. 961,036

Of the briquettes reported this year 7,615,616 tons were made from brown coal or lignite.

Iron Trade Review

New York, July 17—The unexpected point in iron and steel markets is an increase in new orders at a time when a falling off was generally expected. In spite of the season demand continues strong, and the only difficulty is in keeping up with deliveries. Production has been decreased by the continuance of extremely hot weather, which much impairs the efficiency of labor.

The labor situation grows weekly more acute, some mills being actually crippled through the shortage, and the tendency to advance wages is becoming more marked. The Jones & Laughlin Steel Co., July 16, announced general advances to all workmen except those paid tonnage rates, making advances of 5 to 10% in rates paid by the hour and day. This follows a number of advances made by smaller mills. As a rule no publicity has been given to these advances, as the mills are competing for men and when the management of one plant makes an advance, it does not care to have the news widely circulated. The recent strike at the Pennsylvania plant, Pittsburgh, of the National Tube Co., was settled by giving the men several important concessions.

The mills have been closing for the shortest possible periods for repairs, but production is materially curtailed from this cause and on account of the extreme heat, the latter, on account of the high humidity, effecting blast-furnace production as well. From this cause the mills will close the month with nearly as large a tonnage on books as at the opening, though specifications are materially reduced as compared with June. The volume of specifying is, however, very good for the season, and better than was expected.

Foundry iron has been quieter, so far as large sales are concerned, though many small orders are coming in. Basic sales have been good and some bessemer iron sales are reported. The coke question is still a disturbing element, while the number of idle merchant furnaces is an argument against higher prices.

The monthly report of the United States Steel Corporation shows that on June 30 the unfilled orders on the books reached a total of 5,807,346 tons of finished material. This is an increase of 56,366 tons over May 30, and of 722,585 tons over Dec. 31, 1911. It is the largest total of unfilled orders reported at any date since Dec. 31, 1909. Deliveries during June were large but they were apparently exceeded by the orders received.

Baltimore

July 15—Exports for the week included 2003 lb. selenium to Hamburg; 420,780 lb. steel plates to Rotterdam; 3,697,300 lb. steel rails and 230,559 lb. rail fastenings to Vera Cruz. Imports included 100 tons ferromanganese from Rotterdam; 4416 tons cupreous pyrites from Huelva, Spain; 24,150 tons iron ore from Cuba.

Birmingham

July 15—There is a little selling of pig iron going on in the Southern territory for delivery during the last quarter of the year. The furnace companies are holding firmly to the new price, $12 per ton, No. 2 foundry. Third-quarter iron can be purchased at $11.50 per ton, but the manufacturers are booking orders with care, to obviate trouble in filling the orders promptly. The make in this section of the country is to be increased during this month by the blowing in of a furnace, while for the next month it is expected two blast furnaces will be ready. At the present quotations Southern iron makers are getting a better profit than for two years and more. The output during July will show an increase over June.

Considerable foreign business has been booked by Southern makers recently, shipments having been started on iron toward Panama, Australia and Italy, while steel billets have been shipped by the Southern Iron & Steel Co. to Liverpool.

There is no end to the cast-iron pipe demand and the plants will be operated through the balance of the year. Additinal small orders for steel rails and shapes are reported and the general steel conditions are favorable. Machine shop and foundry proprietors are complaining of present conditions. The Mississippi floods, the revolution in Mexico and the revolution in Cuba have disturbed the trade.

The petition seeking to throw the Southern Iron & Steel Co. into involuntary bankruptcy has not yet disturbed the operations of that company.

Chicago

July 16—The iron market shows decided strength for a midsummer time. Sales of pig iron are running larger, several having been made in the last week of 500 to 1000 tons and the tendency is to buy more freely for last-half requirements. There is, however, no boom and the change is considered an indication of the real business in sight rather than any speculative turn. A few inquiries have been made for tonnage running over into 1913, but prices quoted have been too high to stimulate business.

Northern No. 2 foundry and malleable iron sell for $15@15.50, and Southern No. 2 brings $11.50@12, Birmingham, or $15.85@16.35, Chicago, on most sales.

There is some sale at slightly higher and lower prices, depending on conditions. The sellers adhere in general to higher prices for the future.

For finished products the demand continues heavy, with local mills crowded and little new business actively sought. Structural material has a widely distributed sale, though individual sales are not large; bars are in very good demand; railroad buying is large, from standard rails to track fastenings and in plates and sheets there is no significant change from the good demand that has existed for several weeks.

Cleveland

July 15—Iron ore movement is active. There is a little belated buying.

Pig Iron—The market is quiet and sales mainly of small lots. The prices are firmly held. Quotations, Cleveland delivery, are $15.15 for bessemer, $13.75 for No. 2 foundry and $13.25 for forge.

Finished Material—Business has quieted down since July 1, and new orders are rather light, except that there is quite a rush for iron bars, and a fair demand for sheets. Jobbers in this district report that business is good.

Philadelphia

July 17—The advance in coke, the oversold condition of many furnaces and the disposition of many buyers to cover future requirements accounts for the strong condition of the pig-iron market. An advance of 25c. can be made and a further advance is said to be possible. Basic iron is moving upward under liberal sales and improving inquiry. Forge is exceptionally strong, and foundry, especially the better grades, is not easily to be had. Low-grade irons are not as easily to be found and large sales have been made for delivery within this district and outside. The feeling among large consumers throughout the East is to look out for the future. The quotations for No. 2 foundry are $15.75; Virginia iron, $16; gray forge, $15; basic, $15.50; and low phosphorus, $20@25 per ton.

Steel Billets—Billets are advanncing and urgent inquiries are coming to hand from points outside of our territory.

Bars—Bars are selling in a moderate way at 1.30c., and inquiries are rather backward, though most of the mills are well filled.

Sheets—The sheet mills are well supplied with business and offers at requested concessions have been held up by mill men, who believe that further advances are to be safely counted on.

Pipes and Tubes—Tubes are again active. The impression prevails that prices will advance.

Plates—The rush for steel plates continues and the mills are crowded to the limit. A great deal of new work, involving steel plate is in sight.

Structural Material—The advancing prices have had a stimulating effect on many buying interests. Some authorities predict that large consumers will soon precipitate orders on the market of exceptional magnitude. Quotations, 1.45@ 1.50c., tidewater.

Scrap—A great deal of scrap is arriving at the yards and the supply for the present is beyond current requirements. The yard men are making their own terms as to prices and are willing to stock up and hold supplies for autumn distribution.

Pittsburgh

July 16—The American Sheet & Tin Plate Co. this morning announced advances of $2 a ton in uncoated products and $3 a ton in galvanized, making black sheets, 28 gage, 2.05c.; galvanized, 28 gage, 3.15c., and tin-mill black plates, 28 gage, 2.00c. As there is a wide-open market, the new prices do not become the market, which has lately stood at the old prices of the company, as advanced Apr. 11, but the market will probably stiffen to the new rates in a short time. There has been considerable contracting lately, particularly with the automobile and agricultural-implement makers for their respective seasons, at advances from the minimum of the market for early deliveries.

Pig Iron—The market is steadily and more rapidly stiffening, though there is relatively little new buying. The basic market has been helped by the buying of two or three purchasing interests, one large one in particular having picked up 20,000 or 25,000 tons. This buying, with a little by consumers, has cleared off all the $13.25 basic iron and the market is quotable at a minimum of $13.50, Valley. In foundry iron, the $13.25 quotation has quietly disappeared, and this is true also of malleable, so that it may be said in the past week the whole local market outside of bessemer has advanced 25c. Bessemer awaits some active buying. It would not be surprising should some of the large steel works take to buying bessemer within the next 30 days, and this might send the market to $15 ro higher, for there is now no question that the iron and steel market is assured of good conditions at least until nearly the close of the year, and most judges express confidence that the good business will not end there, but will make 1913 a better year than this. We quote: Bessemer, $14.25; basic, malleable and No. 2 foundry, $13.50; forge, $13@13.25, all f.o.b. Valley furnaces, 90c. higher delivered Pittsburgh.

Ferromanganese—The market is quiet, but with occasional buying for late delivery this year. We quote prompt at $50@52, and forward at $48.50, f.o.b. Baltimore.

Steel—Mills have bought limited tonnages of sheet bars at $22, maker's mill, and have bid this price for more, for delivery this side of Sept. 1, without getting the steel. Billets are equally strong, and small billets frequently command higher prices than sheet bars. There is very little tonnage available. The mills are fully sold up for the current quarter and are not ready as yet to name prices for fourth quarter. We quote billets at $21.50 and sheet bars at $22, f.o.b. maker's mill, Pittsburgh, and billets at $21@ 21.50 and sheet bars at $22, f.o.b. maker's mill, Youngstown. Rods are generally quoted at $25, Pittsburgh, but this price could probably be shaded 50c., as formerly.

Sheets—As noted, the American Sheet & Tin Plate Co. has advanced its prices, effective today, and the market as made by the independents will probably work up to the new basis soon, as the mills have been receiving heavy specifications on old contracts and have been making some new ones, being filled up with actual specifications for from four to eight weeks, and having the major part of their probable output for the balance of the year already under contract. Some of the mills are still willing to do the old prices, and we quote: Black sheets, 28 gage, 1.95@2.05c.; galvanized, 28 gage, 3.00@ 3.15c.; blue annealed, 10 gage, 1.45c. The advance in flat sheets by the leading interest makes its prices on 28 gage corrugated as follows: Painted, 2.25c.; galvanized, 3.20c. per pound.

Connellsville Coke—Prompt Connellsville furnace coke has been selling in the past week at all the way from $2 to $2.40. It is claimed the prices from $2 to $2.25 were on inferior cokes, purchased by blast furnaces in the hope of breaking the lines of the operators, who are demanding $2.50 on contracts for the balance of the year. It is known, however, that a few of the operators who are asking $2.50 on contract have slightly shaded the figure on prompt. The question of whether the furnaces will have to pay $2.50 on contract remains unsettled, but the developments in the past week seem to be slightly in favor of the furnaces.

St. Louis

July 15—A few contracts for small lots of iron have been closed but the market in general is dull. Prices are steady, though a trifle lower than a month ago. Those who were quoting $11.50 Birmingham a month ago have nearly all dropped back to $11 on business moving in the next 60 days. As a matter of fact there has been $11 iron on the market all the time. The current quotation is $11 Birmingham or $14.75 St. Louis on No. 2 Southern foundry. Northern iron is being quoted at $15.75 St. Louis, though very little is moving.

Good foundry coke is quoted at $5.65 St. Louis.

Iron Ore Trade

Shipments of iron ore from the Lake Superior district in June were 7,567,555 tons, the largest ever reported in June. For the season to July 1 the shipments, as reported by the Cleveland *Iron Trade Review*, were, in long tons:

Port	1911	1912	Changes
Escanaba	1,067,708	1,641,948	I. 574,240
Marquette	533,738	918,890	I. 385,152
Ashland	662,412	1,332,801	I. 670,389
Superior	2,944,954	4,344,331	I. 1,399,377
Duluth	2,050,134	2,845,478	I. 795,344
Two Harbors	1,577,426	2,607,223	I. 1,029,797
Total	8,836,372	13,690,671	I. 4,854,299

Of the June shipments 5,816,493 tons, or 76.9% of the total, went to Lake Erie ports.

United States Foreign Trade

Exports and imports of iron and steel and of machinery in the United States for five months ended May 31, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1911	1912	Changes
Exports	$104,423,821	$118,568,383	I. $14,144,562
Imports	13,150,714	11,021,069	D. 2,129,645
Excess, exp.	$91,273,107	$107,547,314	I. $16,274,207

Increase in exports 13.5%; decrease in imports 16.2%. The leading articles of iron and steel were, in long tons:

	Exports 1911	Exports 1912	Imports 1911	Imports 1912
Pig iron	69,387	104,497	69,889	41,564
Scrap	39,778	42,127	8,762	6,950
Billets, blooms, etc.	117,119	112,155	16,870	7,858
Bars	59,861	77,976	17,265	8,198
Rails	186,609	177,232	....	1,056
Sheets and plates	135,866	212,543	1,073	1,102
Structural steel	84,624	100,477	.....	888
Wire-rods	7,761	27,792	7,115	6,220
Wire	86,332	94,395	.....	.....
Nails and spikes	31,703	42,266	.....	.....
Tinplates	20,381	36,548	10,389	844
Pipe and fittings	69,465	100,321	.....	.....

Imports of wire are not reported in quantities; values were $279,128 in 1911 and $319,310 in 1912. Exports of mining machinery in 1912 were valued at $2,732,265, a decrease of $179,812 from last year.

METAL MARKETS

New York, July 17—Comparative quiet has characterized the metal markets this week, though speculation in copper is still active abroad.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold			
May 1912	$ 4,450,899	$ 3,346,491	Exp. $1,404,408
" 1911	6,817,149	5,014,741	Exp. 1,802,409
Year 1912	26,225,801	19,653,285	Exp. 6,572,516
" 1911	10,176,807	29,005,312	Imp. 18,828,505
Silver			
May 1912	6,725,781	4,345,032	Exp. 2,380,749
" 1911	5,054,304	3,555,842	Exp. 1,498,462
Year 1912	28,623,028	20,384,764	Exp. 8,238,264
" 1911	28,665,500	18,454,155	Exp. 10,211,345

Exports from the port of New York, week ended July 13: Gold, $2,480,925, chiefly to Paris; silver, $927,103, largely to London. Imports: Gold, $624,070; silver, $101,541, from England, Mexico and South America.

Gold—The price of gold on the open market in London remained at the bank level, 77s. 6d. per oz. for bars and 76s. 4d. per oz. for American coin. Nearly all supplies received went to the Bank of England. In New York some more gold went to Paris; on the other hand some was received from London.

Iridium—The current price of this metal is $63 per oz., New York.

Platinum—The market is quiet and prices are still unchanged, dealers asking $45.50 per oz. for refined platinum and $48 per oz. for hard metal. The foreign market is still unsettled and prices rather nominal.

Our Russian correspondent writes, under date of July 4 that the market and prices are generally without change. The demand from abroad is insignificant and therefore in St. Petersburg no business is forward. The offer of platinum by the starateli at Ekaterinburg has increased considerably, work on the placers being active. Crude metal, 83% platinum, is quoted in St. Petersburg—37,500 rubles per pood; at Ekaterinburg 9.80 rubles per zolotnik—equal to $36.75 and $36.85 per oz. The prices are nominal and subject to negotiation.

Silver—The market the past week has been quiet, with lower tendency owing to selling by Chinese banks. Buyers were also holding back on account of over-speculation. The market closes firmer and quiet at 27⅞d. in London.

Shipments of silver from London to the East, Jan. 1 to July 4, as reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India	£4,354,700	£3,549,700	D. £ 805,000
China	890,400	933,500	I. 43,100
Total	£5,245,100	£4,483,200	D. £ 761,900

SILVER AND STERLING EXCHANGE

July	11	12	13	15	16	17
New York	60⅜	60⅛	60⅛	60⅛	60⅛	60⅝
London	27⅛	27⅜	27⅜	27⅜	27⅜	27⅜
Sterling Ex.	4.8730	4.8730	4.8730	4.8735	4.8740	4.8745

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Copper, Tin, Lead and Zinc

Copper—The market is quiet and unsettled. Both the large consumers and the large producers continue to hold aloof, and the business that is being done is passing between the smaller producers and second hands on the one hand and the smaller consumers on the other. It is being transacted at prices considerably below those at which the larger producers are holding. On July 11 arbitrage dealers took great advantage of the disparity between the European and American markets. Being able to purchase electrolytic copper in Europe at 16½c. and less, they were able to sell in this country at great concessions and still realize a handsome profit. In this way some fairly large quantities were placed with American consumers, business being done in round lots at as low as 16¾c., delivered, usual terms, corresponding to about 16.60, cash, New York. Business of this kind continued during July 12 and 13, after consummation of which there was a rally in the market on July 15, when some sales were made at 17⅛c., delivered, usual terms. Of course, sales to Europe have been impossible under the prevailing conditions. The leading agencies continue out of the market being sold ahead in varying degrees and being at the moment unconcerned about marketing additional supplies. On the other hand, consumers seem to have well provided their future re-

NEW YORK

July	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Tin Cts. per lb.	Lead New York, Cts. per lb.	Lead St. Louis, Cts. per lb.	Zinc New York, Cts. per lb.	Zinc St. Louis, Cts. per lb.
11	16¾ @17⅛	16.60 @16.75	44¾	4.75	4.62½ @4.65	7.10 @7.20	6.95 @7.05
12	16¾ @17⅛	16.70 @16.80	44⅛	4.75	4.62½ @4.65	7.10 @7.20	6.95 @7.05
13	16¾ @17⅛	16.75 @16.85	44⅛	4.75	4.62½ @4.65	7.10 @7.20	6.95 @7.05
15	17 @17⅛	16.95 @17.00	44¾	4.75	4.62½ @4.65	7.15 @7.20	7.00 @7.05
16	17 @17⅛	16.95 @17.00	44	4.75	4.62½ @4.65	7.15 @7.20	7.00 @7.05
17	17 @17⅛	16.95 @17.00	43½	4.75	4.62½ @4.65	7.15 @7.20	7.00 @7.05

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. and that for casting copper usually about 0.125 to 0.2c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market for good ordinary brands, both desilverized and non-desilverized; specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

July	Copper Spot	Copper 3 Mos	Copper Best Sel'td	Tin Spot	Tin 3 Mos	Lead, Spanish	Zinc, Ordinaries
11	73¼	74⅛	79	203¾	198¾	18⅜	26
12	74⅛	74¾	79	201½	197¼	18⅜	26
13	....	....	....	.....	.....	....	....
15	75⅛	75¾	80	201¾	197½	18⅜	26¼
16	75 3/16	75 11/16	80	200¾	196½	18⅜	26¼
17	75 1/16	76⅛	80½	197	195	18⅜	26¼

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £15 = 3.26c.; £25 = 5.44c.; £70 = 15.22c. Variations, £1 = 21¾c.

quirements and are disinclined to buy except at material concessions. The real test of the market will occur a few weeks hence, when the larger agencies are likely to become desirous of marketing the production that is coming forward all the time. The business in Lake copper during the week of July 11-17 has been of insignificant volume and quotations are but nominal, reflecting only the small amount of business transacted by second hands. At the close Lake copper is quoted 17@17⅛c.; electrolytic in cakes wirebars or ingots, 16.95@17c.; while casting copper is quoted nominally at 16½ 16¾c. as an average for the week.

The London standard market has quieted down and has moved within comparatively narrow limits, closing at £75 8s. 9d. for spot and £76 2s. 6d. for three months.

Copper sheets are 22@23c. per lb., base for large lots. Full extras are charged and higher prices for small quantities. Copper wire is 19@19¼c. base, carload lots at mill.

Copper exports from New York for the week were 8502 long tons. Our special correspondent reports the exports from Baltimore at 2648 tons.

Visible stocks of copper in Europe on July 15 are reported as follows: Great Britain, 28,400; France, 6840; Rotterdam, 800; Hamburg, 4950; afloat from Chile, 2300; afloat from Australia, 5800; total, 49,090 long tons, or 109,961,600 lb. This is an increase of 940 tons over the June 30 report.

Tin—The London market has been weak and declining and our market has followed suit. The London dock strike still holds on, but the position over here has been entirely relieved by shipments which have come direct from the East Indies and through European continental ports—so much so that the premium on tin for near-by shipment has now entirely disappeared. During the week, July tin declined from about 44⅞ to about 43½c., and October 43½ to 43 cents.

The London market, which on Thursday, July 11, closed at £203 15s. for spot and £198 15s. for three months, declined on July 12 to £201 10s. and £197 15s., respectively, and on July 16, was £200 10s. for spot and £196 10s. for three months, closing at £197 for spot and £195 for three months.

Shipments of tin from the Straits six months ended July 30 were 25,579 long tons in 1911, and 28,685 in 1912; increase this year 3106 tons.

Tin production of Federated Malay States six months ended June 30, was 20,789 long tons in 1911, and 22,697 tons in 1912; increase this year 1908 tons.

Lead—The market is firm at last prices, 4.75c., New York, and 4.62½@4.65c., St. Louis, at which prices there is a good business doing from day to day.

The London market is firmer, good Spanish lead being quoted £18 10s. and English 2s. 6d. higher.

Spelter—Consumption, both for galvanizing and brass is excellent and the market is very firm at slightly better prices. A moderate tonnage is reported sold during the week of July 11-18, chiefly for July and August delivery, for both of which times a considerable quantity appears to be available. Nobody has been disposed to buy for September or October delivery. At the close we quote 7.15@ 7.20c., New York, and 7@7.05c., St. Louis.

The foreign market is firmer, good ordinaries being quoted £26 5s. and specials £26 10s. per ton.

Base price of zinc sheets is now $8.75 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8% discount.

Zinc dust is quoted at 7¼@7⅜c. per lb. in carload lots, New York.

Other Metals

Aluminum—Business is quieter than it has been. The quotation is 22½@23c. per lb. for No. 1 ingots, New York.

It is said that the standard price for ingot aluminum is to be fixed at £70 per ton, or 15.22c per lb., by the European syndicate.

Antimony—Business continues active, and the market is firm. Cookson's brings 8.25@8.50c. per lb. and Hallett's 7.87½ @8c. For Chinese, Hungarian and other outside brands, 7.30@7.50c. per lb. is paid.

Quicksilver—Business is still rather quiet and there is no change reported in prices. New York quotations are $42.50 per flask of 75 lb., with 60@62c. per lb. asked for retail lots. San Francisco, $42 for domestic orders and $39.50 for export. The London price is £8 10s. per flask, with £8 7s. 6d. asked from second hands.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot from 50c. for 500-lb. lots up to 55c. for 200-lb. lots. The price of electrolytic is 5c. higher.

Spanish Metal Exports

Exports of metals and minerals from Spain, three months ended Mar. 31, reported by *Revista Minera*, in metric tons:

Metals	1911	1912	Changes	
Pig and manuf. iron	13,967	18,702	D.	4,735
Copper	3,019	5,725	I.	2,706
Copper precipitate	3,394	2,712	D.	682
Lead	37,483	43,695	I.	6,212
Zinc	566	549	D.	17
Quicksilver	413	624	I.	211
Minerals				
Iron ore	2,316,340	2,204,240	D.	112,100
Manganese ore	8,168	10,563	I.	2,403
Copper ore	122,579	37,658	D.	84,921
Lead ore	728	850	I.	122
Zinc ore	40,404	35,321	D.	5,083
Pyrites	377,627	716,326	I.	338,699
Salt	114,066	137,075	I.	23,009

Pyritic ores are not classed as copper ores unless they carry 2.5% or over in copper; below that they are classed as pyrites. Last year the dividing line was 1% copper.

Zinc and Lead Ore Markets

Platteville, Wis., July 13—The base price paid this week for 60% zinc ore was $56@58, the highest ever paid in this district. The base price paid for 80% lead ore was $58@59 per ton.

SHIPMENTS, WEEK ENDED JULY 13

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point	839,070	.....	.....
Shullsburg	600,000	80,000	.....
Galena	485,400	.....	.....
Benton	467,900	.....	562,000
Hazel Green	467,000	.....	.....
Platteville	372,600	.....	191,500
Cuba City	245,890	.....	.....
Harker	210,940	.....	.....
Linden	.....	.....	80,000
Total	3,688,800	80,000	833,500
Year to date	110,604,130	4,576,470	16,207,570

Shipped during week to separating plants, 2,080,190 lb. zinc ore.

Joplin, Mo., July 13—The high price of zinc sulphide ore this week was $63, the base per ton of 60% zinc was $54@ 60. Zinc silicate sold at $30@31 per ton of 40% zinc. The average price all grades was $56.32. The high price of lead ore was $61 base per ton of 80% lead, and the average price all grades was $59.28 per ton.

The zinc-ore market took a big jump this week when competition became strong on Friday.

SHIPMENTS, WEEK ENDED JULY 13

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	3,918,620	.....	1,140,260	$148,547
Joplin	2,278,930	.....	241,340	73,207
Duenweg	745,000	.....	289,990	30,565
Galena	753,600	.....	57,600	23,524
Oronogo	443,128	.....	356,210	20,728
Cave Springs	636,580	.....	.....	18,460
Alba-Neck	593,800	.....	17,690	17,732
Jackson	183,320	.....	113,750	8,544
Spurgeon	105.620	269,850	17,040	7,756
Miami	256,100	.....	.....	6,400
Wentworth	193,310	.....	.....	5,412
Carthage	172,210	.....	.....	4,821
Granby	7,800	132,420	41,220	3,230
Lawton	61,700	.....	.....	1,789
Sarcoxie	53,470	.....	.....	1,496
Aurora	.....	.....	47,310	1,324
Totals	10,414,180	402,270	2,322,410	$373,535
28 weeks	283,305,810	17,313,960	48,601,130	$8,787,588

Blende val., the week, $298,409; 28 weeks, $7,195,584
Calamine, the week, 6,267; 28 weeks, 258,101
Lead value, the week, 68,859; 28 weeks, 1,333,903

MONTHLY AVERAGE PRICES

Month	Zinc Ore				Lead Ore	
	Base Price		All Ores		All Ores	
	1911	1912	1911	1912	1911	1912
January	$41.85	$44.90	$40.55	$43.54	$55.68	$58.92
February	40.21	45.75	39.16	43 31	54.46	52.39
March	39.85	51.56	38.45	49.25	54.57	54.64
April	38.88	52.00	37.47	50.36	56.37	54.18
May	38.25	55.30	36.79	53.27	55.21	52.45
June	40.50	55 88	38.18	54.38	56.49	55.01
July	40.75	.....	38.36	.....	58.81	.....
August	42 50	.....	41.28	.....	60.74	.....
September	42 63	.....	41 29	.....	59 33	.....
October	42.38	.....	40.89	.....	54.72	.....
November	45.40	.....	43.27	.....	57 19	.....
December	44.13	.....	40.76	.....	62.03	.....
Year	$41.45	.....	$39.90	.....	$56.76	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Other Ore Markets

Manganese Ore—The price for domestic ores, as fixed by large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 49 per cent., or over in manganese, not over 0.20 phosphorus and 8 per cent. silica. Prices range down to 23c. per unit for 40 per cent. manganese; with deductions for excess phosphorus and silica.

These prices are put at a high level to encourage exploration for manganese deposits in the United States. Most of the manganese ore used here is imported —from India, Brazil and Russia—and is bought abroad on the open market.

The latest quotations in Great Britain are: Indian or Brazilian ore, 50 per cent. manganese, 19@19½c. per unit; 45 per cent., 17½@18c. Caucasian, 50 per cent., 16@16½c.; 48 per cent., 15½@16c. per unit.

New Caledonia Ores

Exports of ores from New Caledonia four months ended April 30, as reported by the *Bulletin du Commerce* of Noumea, were 10,958 metric tons of nickel ore and 15,994 tons of chrome ore. Exports of metals were 937 tons of nickel matte.

Chemicals

New York, July 17—Midsummer dullness continues to rule in the general market.

Arsenic—Supplies are again rather scarce, and prices have advanced, $4@4.25 per 100 lb. being paid for spot lots. Futures are $3.75 per 100 pounds.

Copper Sulphate—The market is rather quiet. Quotations are unchanged at $5.50 per 100 lb. for carload lots and $5.75 per 100 lb. for smaller parcels.

Nitrate of Soda—Trade is not active. Quotations for spot are unchanged at 2.45c. per lb., but futures are a trifle easier, 2.42½c. per lb. being asked for September and October.

Petroleum

The monthly statement of the *Oil City Derrick* shows new wells completed in June as follows: Pennsylvania and West Virginia, 491; Lima-Indiana, 54; Kentucky, 15; Illinois, 122; Kansas-Oklahoma, 712; Texas-Louisiana, 120. In all the divisions there were 1514 wells completed, being 193 more than in May. New production was 58,984 bbl., an increase of 5040 bbl. The divisions showing increased production are Lima, Illinois and the Mid-Continent. Dry holes number 235 and gas wells 131, an increase of 15 dry holes and 11 gas wells. The productive oil wells number 1148 as against 981 in May. At the close of June there were 471 rigs and 1431 drilling wells. These figures show a decrease of 42 rigs and an increase of 187 drilling, as compared with the May report. All divisions show an increase in new work with the exception of Kentucky and Texas-Louisiana.

Mining Stocks

New York, July 17—The limiting factor in the market this week has been the condition of the banks and the curtailment of speculative loans.

July 11 the Exchange was rather narrow and prices inclined to weakness. Steel common was off to a lower level. The Curb was quiet and slow and prices irregular. Coppers were firm but other mining stocks were weak.

July 12 the Exchange was dull and weaker. The Curb was irregular, showing activity in spots. Braden was the only active copper stock. Cobalts were dull, but El Paso and Tonopah Extension were active at declines.

July 13 the Exchange and the Curb were both narrow. Coppers were firm, but other mining stocks were neglected.

July 15 prices on the Exchange were stronger but on limited trading. The Curb was quiet and narrow, but copper stocks were inclined to advance a little.

July 16 and 17 the Exchange was again stronger. There were advances in Amalgamated Copper and in Steel common. The Curb was rather scattering in its sales but generally firm in prices, with some advances in copper shares, but rather limited trading in other mining stocks.

At auction in New York, July 11, the following sales were made: 1000 shares Mexican Lead common, $350 for the lot; 15,000 shares Batopilas Mining Co., $20 par, $1.02 per share; 80 shares American Smelting & Refining Co., $100 par, $82 per share; 80 shares Wolverine Copper Co., $25 par, $105 per share.

Boston, July 16—Midsummer dullness has set in upon the metal-share market, and, along with it, uncertain price movements, although all told they maintain a generally strong undertone. Superior Copper has attracted attention during the week by a sharp advance to $48.50, which has been maintained for the most part. Isle Royale also gave a good account of itself by advancing to $35.25, and this rise was pretty much all held. These two stocks seem to be the favorites, marketwise, among the Lake Superior issues.

Butte & Superior shows liquidating sales by a break of $3.87½ to $41.12½. It is said that the promoters of this company took their underwriting bonus in stock and have marketed it all at a good-sized profit to themselves. Ahmeek and Osceola easily respond to buying orders. The former sold at $345 today and the latter at $117. Granby rose $2 to $53.25. It is announced that the Lake company has stopped shipments for a short time in order to make preparations and to get men for an increased tonnage. It is also

COPPER SMELTERS' REPORTS

This table is compiled from reports received from the respective companies, except in the few cases noted (by asterisk) as estimated, together with the reports of the U. S. Dept. of Commerce as to imported material, and in the main represents the crude copper content of blister copper, in pounds. In those cases where the copper contents of ore and matte are reported, the copper yield thereof is reckoned at 95%. In computing the total American supply duplications are excluded.

Company	April	May	June
Alaska shipments.	1,243,911	1,720,391	4,134,569
Anaconda	25,480,000	25,800,000	.....
Arizona, Ltd.	3,400,000	3,500,000	3,300,000
Copper Queen	6,806,425	7,024,087	7,622,733
Calumet & Ariz.	4,104,000	4,424,000	4,160,000
Chino	1,150,000	1,275,850	.....
Detroit	2,506,718	2,092,478	1,959,634
East Butte	1,400,000	1,445,000	.....
Mammoth	1,718,450	.....	.....
Mason Valley	1,503,056	1,520,000	.....
Nevada Con.	6,115,095	6,063,462	.....
Ohio	675,000	.....	.....
Old Dominion	2,167,000	2,180,000	2,130,000
Ray	2,611,920	2,924,913	2,992,500
Shannon	1,544,000	1,464,000	1,270,000
South Utah	284,215	236,884	.....
United Verde*	2,250,000	2,500,000	.....
Utah Copper Co.	8,615,775	9,564,919	.....
Lake Superior*	18,250,000	21,250,000	15,600,000
Non-rep. mines*	7,625,000	8,400,000	8,300,000
Total production.	97,400,495	.....	.....
Imports, bars, etc.	26,842,014	25,836,519	.....
Total blister	124,242,509	.....	.....
Imp. in ore & matte	9,350,972	6,410,226	.....
Total American	133,593,481	.....	.....
Miami†	2,554,352	2,565,000	2,584,950
Brit. Col. Cos.:			
British Col. Copper	1,043,173	875,000	996,000
Granby	1,941,797	1,914,460	1,888,400
Mexican Cos.:			
Boleo†	2,149,280	2,260,160	1,851 920
Cananea	4,654,000	4,600,000	4,310,000
Moctezuma	2,797,718	2,892,521	3,176,819
Other Foreign:			
Cape Cop., S. Africa	954,240	754,880	.....
Kyshtim, Russia	1,545,000	.....	.....
Spassky, Russia	649,600	694,400	.....
Famatina, Argen.	.....	.....	.....
Tilt Cove, Newf'd.	119,869	123,087	.....
Exports from:			
Chile	6,496,000	3,696,000	9,856,000
Australia	9,408,000	7,840,000	8,176,000
Arrivals in Europe‡	12,064,640	9,976,860	12,667,200

†Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister.

‡Does not include the arrivals from the United States, Australia or Chile.

STATISTICS OF COPPER.

Month	U.S.Refin'y Product'n	Deliveries, Domestic	Deliveries for Export
VI, 1911.	124,554,312	61,655,561	71,460,519
VII.	112,167,934	56,982,582	74,880,658
VIII.	125,493,667	59,935,364	69,855,660
IX.	115,588,950	57,311,584	50,824,011
X.	118,255,442	64,068,307	60,084,349
XI.	111,876,601	68,039,776	67,049,279
XII.	122,896,697	65,988,474	79,238,716
Year	1,431,938,338	709,611,605	754,902,233
I, 1912.	119,337,753	62,343,901	80,167,904
II.	116,035,809	56,228,368	63,148,096
III.	125,694,601	67,487,466	58,779,566
IV.	125,464,644	69,513,846	53,252,326
V.	126,737,836	72,702,277	69,485,945
VI.	122,315,240	66,146,229	61,449,650

	VISIBLE STOCKS		
	United States	Europe	Total
VII, 1911.	157,434,164	195,932,800	353,366,964
VIII.	137,738,858	191,891,840	329,630,698
IX.	133,441,501	191,228,800	324,670,301
X.	140,894,856	191,945,600	332,840,456
XI.	134,997,642	176,825,600	311,823,242
XII.	111,785,188	164,281,600	276,066,788
I, 1912.	89,454,695	158,323,200	247,777,895
II.	66,280,643	154,851,200	221,131,843
III.	62,939,988	141,142,400	204,082,380
IV.	62,367,557	136,819,200	199,186,754
V.	65,066,029	134,176,000	199,242,089
VI.	49,615,643	117,801,600	167,417,232
VII.	44,335,004	108,186,000	152,521,047

said that owing to the scarcity of labor at the mines in Michigan, men will be sent from the East.

On the Curb business has been of fair proportions. Davis Daly and Nevada Douglas have shown some strength, while Ohio Copper fell to 30c. today.

Assessments

Company	Delinq	Sale	Amt
Best & Belcher, Nev	June 3	June 27	$0.10
Buffalo, Mont.	June 4	July 2	0.002
Challange, Nev.	June 8	July 2	0.10
Chollar, Nev.	July 7	Aug. 5	0.10
Confidence, Nev.	July 15	Aug. 9	0.20½
Con. Imperial, Nev.	July 28	Aug. 21	0.01
Crown Point, Nev.	June 24	July 17	0.10
Gould & Curry, Nev.	July 19	Aug. 12	0.05
Great Falls, Utah	June 26	July 27	0.002½
Hale & Norcross, Nev.	July 2	July 29	0.05
Houghton Copper, Mich.	May 17		1.00
Julia, Nev.	May 15	June 5	0.05
Mineral Farm, Ida.	July 15	Aug. 15	0.002
Mineral Hill, Nev.	Aug. 5	Oct. 5	0.01
New Reliance, S. Dak.			0.01
O. K. Silver Mining, Utah	July 15	Aug. 1	0.002½
Oreano, Ida.	July 18	Aug. 19	0.001
Overman, Nev.	June 29	July 23	0.10
Savage, Nev.	June 4	June 26	0.10
Seven Troughs, Nev.	June 15	July 2	0.002½
Sierra Nevada, Nev.	July 4	July 30	0.10
Silver Mt., Ida.	July 15	Aug. 15	0.002
Tintic Central, Utah	June 14	July 6	0.005
Union Consolidated, Nev.	July 12	Aug. 7	0.15
Utah Antimony, Utah	June 1		0.03
Utah, Nev.	July 12	Aug. 6	0.05
Yankee Con., Utah			0.02
Yellow Jacket, Nev	July 4	Aug. 12	0.10

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1910	1911	1912	1910	1911	1912
January	52.375	53.795	56.260	24.154	24.865	25.887
February	51.534	52.222	59.043	23.794	24.081	27.190
March	51.454	52.745	58.375	23.690	24.324	26.875
April	53.221	53.325	59.207	24.483	24.595	27.284
May	53.870	53.308	60.880	24.797	24.583	28.038
June	53.462	53.043	61.290	24.651	24.486	28.215
July	54.150	52.630	.....	25.034	24.286	.....
August	52.912	52.171	.....	24.428	24.082	.....
September	53.295	52.440	.....	24.567	24.209	.....
October	55.490	53.340	.....	25.596	24.594	.....
November	55.635	55.719	.....	25.680	25.649	.....
December	54.428	54.905	.....	25.160	25.349	.....
Year	53.486	53.304	.....	24.670	24.592	.....

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

	New York				London, Standard	
	Electrolytic		Lake			
	1911	1912	1911	1912	1911	1912
January	12.295	14.094	12.680	14.337	55.600	62.760
February	12.256	14.084	12.611	14.329	54.974	62.893
March	12.139	14.698	12.447	14.868	54.704	65.884
April	12.019	15.741	12.275	15.930	54.034	70.294
May	11.989	16.031	12.214	16.245	54.313	72.352
June	12.385	17.234	12.611	17.443	56.365	78.259
July	12.463	.....	12.720	.....	56.673	.....
August	12.405	.....	12.634	.....	56.266	.....
September	12.201	.....	12.508	.....	55.253	.....
October	12.189	.....	12.370	.....	55.170	.....
November	12.616	.....	12.769	.....	57.253	.....
December	13.552	.....	13.768	.....	62.068	.....
Year	12.376	.....	12.634	.....	55.973	.....

New York, cents per pound. London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Month	1911	1912	Month	1911	1912
January	41.255	42.529	July	42.400	.....
February	41.614	42.962	August	43.319	.....
March	40.157	42.577	September	39.755	.....
April	42.185	43.923	October	41.185	.....
May	43.115	46.053	November	43.125	.....
June	44.606	45.815	December	44.655	.....
			Av. Year	42.281	.....

Prices are in cents per pound.

LEAD

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	4.483	4.435	4.334	4.327	13.009	15.619
February	4.440	4.026	4.266	3.946	13.043	15.738
March	4.394	4.073	4.238	4.046	13.122	15.997
April	4.412	4.200	4.262	4.118	12.889	16.331
May	4.373	4.194	4.223	4.072	12.984	16.509
June	4.435	4.392	4.292	4.321	13.260	17.588
July	4.499	.....	4.397	.....	13.530	.....
August	4.500	.....	4.406	.....	14.260	.....
September	4.485	.....	4.356	.....	14.744	.....
October	4.265	.....	4.139	.....	15.332	.....
November	4.298	.....	4.181	.....	15.821	.....
December	4.450	.....	4.332	.....	15.648	.....
Year	4.420	.....	4.286	.....	13.970	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	5.452	6.442	5.302	6.292	23.887	26.642
February	5.518	6.499	5.368	6.349	23.276	26.661
March	5.563	6.626	5.413	6.476	23.016	26.048
April	5.399	6.633	5.249	6.483	23.743	25.644
May	5.348	6.679	5.198	6.529	24.375	25.790
June	5.520	6.877	5.370	6.727	24.612	25.763
July	5.695	.....	5.545	.....	25.006	.....
August	5.953	.....	5.803	.....	26.801	.....
September	5.869	.....	5.719	.....	27.750	.....
October	6.102	.....	5.951	.....	27.256	.....
November	6.380	.....	6.223	.....	26.795	.....
December	6.301	.....	6.151	.....	26.849	.....
Year	5.758	.....	5.608	.....	25.281	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

	Bessemer		Basic		No. 2 Foundry	
	1911	1912	1911	1912	1911	1912
January	$15.90	$15.12	$14.40	$13.32	$14.75	$14.00
February	15.90	15.03	14.50	13.28	14.81	14.01
March	15.90	14.95	14.65	13.66	14.96	14.10
April	15.90	15.13	14.65	13.90	15.00	14.15
May	15.90	15.14	14.30	13.90	14.72	14.12
June	15.90	15.15	14.06	14.11	14.56	14.22
July	15.90	.....	14.03	.....	14.53	.....
August	15.90	.....	14.00	.....	14.47	.....
September	15.90	.....	13.57	.....	14.40	.....
October	15.43	.....	13.44	.....	14.34	.....
November	14.92	.....	13.30	.....	14.25	.....
December	15.15	.....	13.10	.....	13.90	.....
Year	$15.72	.....	$13.94	.....	$14.49	.....

STOCK QUOTATIONS

COLO. SPRINGS July 16

Name of Comp.	Bid.
Acacia	.04½
Cripple Cr'k Con.	.01
C. K. & N.	.17
Doctor Jack Pot	.05½
Elkton Con.	.64
El Paso	.95½
Findlay	.04½
Gold Dollar	.18
Gold Sovereign	.02
Isabella	.13
Jack Pot	.04
Jennie Sample	.05½
Lexington	‡ .02
Moon Anchor	.01
Old Gold	.04
Mary McKinney	.69½
Pharmacist	.01½
Portland	.92
Vindicator	.80
Work	.01½

SALT LAKE July 16

Name of Comp.	Bid.
Beck Tunnel	.09½
Black Jack	.15
Cedar Talisman	.02
Colorado Mining	.18
Columbus Con.	.26½
Crown Point	.02½
Daly-Judge	‡5.60
Grand Central	.52
Iron Blossom	1.37½
Little Bell	.25
Lower Mammoth	.02
Mason Valley	12.50
May Day	.13½
Nevada Hills	2.00
New York	‡ .04½
Prince Con	1.55
Silver King Coal'n	2.65
Sioux Con.	.04½
Uncle Sam	.20
Yankee	‡.12

TORONTO July 16

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	7.35	Hollinger	12¾
Hudson Bay	‡70.00	Imperial	.01
Temiskaming	.36	Pearl Lake	.18
Wettlaufer-Lor.	.56	Porcu. Gold	.34
Apex	.03	Porcu. Tisdale	.01
Central	‡5.56	Preston E. D.	.02
Crown Chartered	.10	Rea	.24
Dobie	‡.25	Standard	‡.01½
Dome Exten.	.15	Swastika	.09
Foley O'Brien	.15	West Dome	.15

SAN FRANCISCO July 16

Name of Comp.	Clg.	Name of Comp.	Bid
COMSTOCK STOCKS		MISC. NEV. & CAL.	
Alta	.12	Belmont	8.90
Belcher	.52	Jim Butler	.58
Best & Belcher	.08	MacNamara	.22
Caledonia	1.60	Midway	.49
Challenge Con.	.14	Mont.-Tonopah	2.45
Chollar	.12	North Star	.19
Confidence	.65	West End Con.	1.60
Con. Virginia	.38	Atlanta	.23
Crown Point	.56	Booth	.08
Gould & Curry	.01	C.O.D. Con.	.10
Hale & Norcross	.21	Comb. Frac.	.13
Mexican	2.72½	Jumbo Extension	.37
Occidental	.50	Pitts.-Silver Peak	1.00
Ophir	.99	Silver Pick	.11
Overman	1.05	St. Ives	.33
Potosi	.04	Tramp Con.	‡.01
Savage	.11	Argonaut	‡2.00
Sierra Nevada	.23	Bunker Hill	‡4.50
Union Con.	.59	Cent. Eureka	.41
Yellow Jacket	.67	So. Eureka	‡2.90

N. Y. EXCH. July 16

Name of Comp.	Clg.
Amalgamated	82⅛
Am. Agri. Chem.	61
Am.Sm.&Ref.,com	82¼
Am. Sm. & Ref., pf.	121
Am. Sm. Sec., pf. B	88
Anaconda	40¾
Batopilas Min.	1⅛
BethlehemSteelpf	62
Chino	31
Comstock Tunnel	‡.12
Federal M. & S., pf.	43
Goldfield Con.	4
GreatNor.,ore,ctf.	43
Guggen. Exp.	55⅛
Homestake	96
Inspiration Con.	18¾
Miami Copper	28⅛
Nat'nalLead,com.	57⅛
National Lead, pf.	109
Nev. Consol.	20¼
Pittsburg Coal, pf.	91⅞
Ray Con.	20⅝
RepublicI&S,com.	26⅛
Republic I & S, pf.	85
SlossSheffi'd,com.	54
Sloss Sheffield, pf.	100
Tennessee Copper	42⅜
Utah Copper	61¼
U. S. Steel, com.	69⅛
U. S. Steel, pf.	111⅜
Va. Car. Chem.	48½

N. Y. CURB July 16

Name of Comp.	Clg.
Barnes King	.25
Beaver Con	.42
Braden Copper	6⅞
B. C. Copper	5¾
Buffalo Mines	‡1.40
Caledonia	.40
Con. Ariz. Sm.	⅛
Davis-Daly	2⅝
Diam'field-Daisy	9
Ely Con.	⅜
Florence	.99
Giroux	4⅛
Gold Hill Con.	⅜
Greene Cananea	9¾
Greenwater	.05
Internat. S. & R.	124
Kerr Lake	3
Keystone	2⅛
La Rose	3½
McKinley-Dar-Sa.	1¾
Min. Co. of A. new	3
Motherlode Gold.	1⅛
Nev. Utah M. & S.	‡.03½
Nipissing Mines	7⅝
Ohio Copper	⅛
Pacific Sm. & M.	3/32
South Live Oak	2¾
South Utah M. & S.	¾
Standard Oil (Old)	865
Stand'd Oil of N.J.	391
Stand'd Oil Subs.	525
Stewart	1⅛
Tonopah	6⅛
Tonopah Ex.	2⅛
Tri-Bullion	⅛
Tularosa	‡⅛
Union Mines	⅛
United Cop., pfd.	10
Yukon Gold	3¾

LONDON July 17

Name of Com.	Clg.
Camp Bird	£1 8s 3d
Dolores	1 10 0
El Oro	0 15 0
Esperanza	1 7 6
Mexico Mines	6 17 6
Oroville	0 5 9
Stratton'sInd.	0 3 1½
Tomboy	1 6 3

BOSTON EXCH. July 16

Name of Comp.	Clg.
Adventure	8⅜
Ahmeek	345
Algomah	5¼
Allouez	44
Am. Zinc	30⅛
Ariz. Com., ctfs.	5⅝
Bonanza	.56
Boston & Corbin	7⅛
Butte & Balak	‡3½
Calumet & Ariz.	74
Calumet & Hecla	515
Centennial	‡24
Con. Mercur	‡.05
Copper Range	56¾
Daly West	5
East Butte	‡13¼
Franklin	11
Granby	53
Hancock	30¾
Hedley Gold	17
Helvetia	1¼
Indiana	16⅞
Island Cr'k, com.	‡61
Island Cr'k, pfd.	89¼
Isle Royale	34⅜
Keweenaw	‡1¾
Lake	34⅜
La Salle	7
Mass	6¼
Michigan	2⅜
Mohawk	66⅜
New Arcadian	3
New Idria Quick.	‡6⅞
North Butte	30⅛
North Lake	5⅜
Ojibway	‡4½
Old Dominion	56¾
Osceola	116
Quincy	88½
Shannon	16¾
Shattuck-Ariz.	20¾
Superior	47¾
Superior & Bost.	1⅞
Tamarack	40
Trinity	5¾
Tuolumne	‡3½
U. S. Smelting	44½
U. S. Smelt'g, pf.	49⅝
Utah Apex	2¼
Utah Con.	10⅜
Victoria	3¼
Winona	5⅞
Wolverine	108
Wyandot	2

BOSTON CURB July 16

Name of Comp.	Last
Bingham Mines	4½
Boston Ely	1
Boswyocolo	.02½
Butte Central	6⅞
Cactus	.09
Calaveras	27
Chief Cons	1⅜
Corbin	.97
Cortez	1
Crown Reserve	3½
First Nat. Cop.	1⅛
Majestic	.44
Mazatan	⅛
Moneta Porc.	‡.07
Nevada-Douglas	3⅜
New Baltic	2
Oneco	1½
Raven Copper	.27
Rhode Island Coal	.15
San Antonio	‡3
S. W. Miami	6
South Lake	9½
Trethewey	.45
United Verde Ext.	.40
Vulture	‡5.00

‡Last quotation.